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GUIDE TO WEED CONTROL IN ALBERTA

PART I — CHEMICAL

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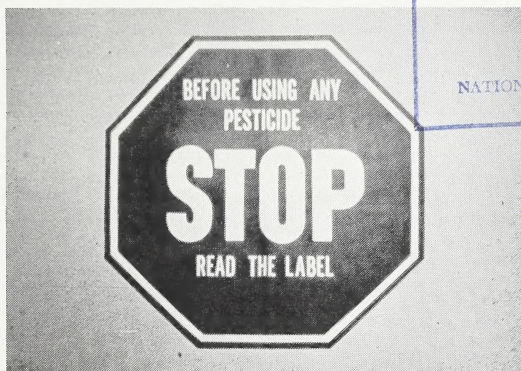
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GUIDE TO WEED CONTROL IN ALBERTA

PART I — CHEMICAL

PREPARED BY ALBERTA AGRICULTURE



THIS PUBLICATION CONTAINS SELECTOR CHARTS AND DESCRIPTIVE TEXT WHICH **MUST** BE USED AS A UNIT.


NOTE: While every effort has been made to ensure accuracy — Consult the label for final detailed instructions.

DO NOT USE THE SELECTOR CHART WITHOUT REFERENCE TO THE MANUAL FOR DETAILED INSTRUCTION.

INSTRUCTIONS FOR USE:

1. IDENTIFY THE WEED(S).
2. REFER TO THE APPROPRIATE SELECTOR CHART FOR YOUR CROP.
3. NOTE THE HERBICIDES AVAILABLE FOR CONTROL FROM THE CHART.
4. LOOK UP EACH HERBICIDE AND NOTE CHARACTERISTICS, METHOD OF APPLICATION AND OTHER WEEDS CONTROLLED, ETC.
5. SELECT THE MATERIAL BEST SUITED TO YOUR NEED AND APPLY ACCORDING TO DIRECTIONS GIVEN.

NOTE: ALL RATES REFER TO QUANTITY OF COMMERCIAL PRODUCT, **NOT** TO ACTIVE INGREDIENT.



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HERBICIDE DESCRIPTIONS

Name	Page	Name	Page
Aatrex	10	dalapon	31, 48
Afolan F	12	2,4-D	44
alachlor	69	2,4-D + bromacil	40
Amiben	14	2,4-D + dichlorprop	47, 59
amitrole	16	2,4-D + mecoprop + dicamba	26
Amitrol-T	16	2,4-D + picloram	120
amitrole + simazine	18	2,4-DB	53
Amizine	18	Desormone 7	48
asulam	20	dicamba	26
Asulox F	20	dicamba + mecoprop + 2,4-D	26
Avadex BW	22	dicamba + mecoprop + MCPA	26
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CHEMICAL WEED CONTROL IN ALBERTA

INTRODUCTION

Weeds increased in Alberta during the 1970s despite all the technological advances that took place during this decade.

Canada thistle is now the number one perennial weed in the province and wild oats continue to plague many farmers, despite an aggressive and expensive control program during the first half of the 1970s. Stork's-bill, first discovered in Alberta in the early 1970s, is spreading, and scentless chamomile, which was confined to a relatively few districts, is now widespread. Nodding thistle has a foothold in the Calgary area and diffuse and spotted knapweed are presently in southern Alberta pastures.

The list could go on and on. Why? Is it because we are directing all our efforts towards controlling weeds and paying insufficient attention to their prevention? In every age, since agriculture was first practised, the means and the tools to control weeds have been available. A number of new tools were added in the 1970s and yet there is little evidence of ground gained. This is not the case everywhere. In some areas in Europe, the main problem is not weeds but volunteer growth from the previous crop. The weeds have been conquered by using all the tools of the trade, both new and old. Are we in North America being carried away by new tools to the point where we are discarding all the old ones - the ones that served agriculture well in the decades gone by?

IDENTIFYING THE PROBLEM

Often weed control is undertaken on an emergency basis. This is never good. Sometimes more expensive or less effective controls must be used than would have been the case if the problem had been anticipated or at least detected early. Check fields early and try to anticipate the possible problems, based on last year's weed situation.

A publication discussing non-chemical and integrated methods of weed control in considerable detail will be available later in 1981.

CHEMICAL CONTROL

Many herbicides are available for use on the weeds and crops common in Alberta. As well, herbicides are being tested and registered for use in lentils, fababeans and various other special crops. It is a rare weed problem that does not have some form of chemical control available. Herbicides have become very popular because of cost efficiency, and because they are the only control available for use in the growing crop.

Although years of research are completed before any herbicide is registered for use in Canada and then recommended for application in Alberta, there are always a number of failures associated with herbicide use. They fall into two categories:

- (a) Crop damage
- (b) Inadequate control

The directions for use of herbicides are explicit and are always stated on the label. Most but not all failures can be explained by the applicator failing to follow the label directions.

MOST COMMON REASONS FOR HERBICIDE FAILURE

1. Improper application

- Failure to apply the recommended amount. Where rate ranges are given, the minimum is for use on light infestations using good application equipment and techniques. Growing conditions are assumed to be good to excellent and the crop competition normal. Where conditions are less favourable or where the weed population is high the rate should be increased to the maximum allowed.
- Applications made with poor nozzles, inadequate pressure or inadequate water volumes will result in unsatisfactory control and possible crop damage. Coverage is particularly important with contact herbicides.
- Failure to incorporate soil-applied materials soon enough or thoroughly enough. Herbicides may be lost by evaporation or by chemical breakdown through exposure to sunlight. Follow the label instructions carefully and ensure the soil is in proper condition to receive the herbicide.
- Use of poor quality water may result in a loss of activity with some herbicides. Suspended soil particles, or water with a high pH or high mineral content may actually cause a reaction with some herbicides and reduce herbicidal effectiveness.
- Heavier textured and higher organic soils generally require higher rates of soil-applied herbicides. Check with your supplier or agriculture personnel if this information is not on the label.

2. Improper Timing

Each weed has a most susceptible stage and each crop a most tolerant stage. The most common problem is treating the crop too late, after the weeds have developed some resistance. The rule of thumb is to treat early within the recommended stage. (Mataven is an exception).

3. Selection of the wrong material

It is rare for a farmer to use a herbicide which is totally unsuited to the purpose, but where a mixture of weeds exists and there are several products that could do the job, the choice is often difficult. Study the selector chart closely and try to match the herbicide to your **weed spectrum**. The only certain way to do this is to closely examine your field and do some sample counts.

It is vital for you to be able to identify weeds in the seedling stage.* If you cannot do this, help is available from your district agriculturist, agricultural fieldman, chemical dealer, or technical representatives of herbicide companies.

* See insert on leaf stages in grassy species.

4. Resistant species or resistant strains

Not all weeds are the same, you may have a resistant population, either because you have used a herbicide for a long time and the survivors are resistant, or because you happen to have a naturally resistant strain of the weed. To prevent the development of resistance you should rotate your herbicides at the first sign of any problem. If your weeds seem naturally resistant then try a different herbicide.

Precautions When Using Herbicides

1. Spray drift can damage susceptible crops or ornamentals. Loss of herbicide due to drift can also lead to poor results in your field. Avoid spray drift by using large volume nozzles (which produce larger droplets), by using wide angle nozzles (which allow lower spray boom heights) and by spraying only when the wind is low. Wind speeds should not be over 16 km/hr, but specialized equipment may allow spraying in higher winds. Low pressure nozzles and special additives designed to reduce drift are available.
2. Avoid spraying foliar materials when the leaves are wet from rain or heavy dew. The water droplets shaking off the leaves will take some of the herbicide with them.
3. Bees may be affected by herbicides or honey may be contaminated. Avoid spraying near hives or contaminating puddles of water from which bees may drink. Try to spray early in the morning or late in the afternoon when bee activity is at a minimum. Best of all, warn any beekeepers in the immediate vicinity of your intentions so they can confine the bees or move them until spraying is over.
4. Follow storage instructions stated on the label, for example freezing, nearness to food or feedstuffs, heat, etc.
5. Make sure herbicide containers are completely empty when you are finished. We suggest rinsing the pail with water three times and adding the wash water to the sprayer tank. The container is then virtually clean and may be crushed and disposed of at a landfill site. Never re-use the container for other purposes. Check the label for specific disposal instructions.
6. Many herbicides can be tank mixed to achieve a wider range of weed control or to extend the time range over which they may be applied. A mixture of two or more herbicides may prove beneficial, or some mixtures may simply act as if the components were applied separately.

There are a number of mixtures in which the activity of one or both of the chemicals is reduced. Many potential mixtures have not been tested. For this reason and because of the possibility of unknown hazards related to residues in the crops we suggest you use only registered tank mixes. Follow the directions on the label.

7. Control systems using electrically operated solenoid valves are available. These allow sprayers to be controlled remotely, preferably from within the extra protection of a cab. Trucks or tractors equipped with cabs provide some protection against spray drift and a good tight cab with filtered air intake should reduce exposure to a minimum.

CHEMICAL SAFETY

Exposure to pesticides:

Skin contact - Many chemicals can pass through the skin and enter the bloodstream. They can cause immediate illness or accumulate over a period of time. Many chemicals that do not go through the skin can still cause skin problems - redness, blisters, or dry scaliness leading to serious skin eczema.

Eye damage - Pesticides coming in contact with the eye can cause blinding, and can also enter the bloodstream and cause poisoning. Particles can scratch or irritate the eye. They may also dissolve and cause further damage.

Inhalation or breathing - Injury is more likely from breathing fumes and vapors of pesticides or breathing the dust than by contact with the liquid or solid itself. The lungs themselves can be damaged or restrict the flow of air. They can also pass contaminated oxygen into the bloodstream.

Oral ingestion - Chemicals may be accidentally swallowed by being licked off the lips or by eating and/or smoking with dirty hands. Eating food that has been exposed to a chemical atmosphere can cause illness.

Accidental ingestion of pesticides can occur when herbicides are stored in containers such as soft drink bottles. Prevent this by storing herbicides in their original containers and in a securely locked storage area.

Toxicology - Often low levels of contaminants in the human body will not produce noticeable effects. Initially the body has the ability to cope with small amounts of chemicals, however as the dosage increases, the body loses this ability and permanent disability or even death can occur.

Toxicity Terms:

LD₅₀ (Lethal Dosage) - The dosage which will kill exactly 50 per cent of the test population. Expressed as milligrams of chemical per kilogram of body weight (mg/kg).

LC₅₀ (Lethal Concentration) - The concentration (in air or for fish in water) of material which will kill exactly 50 per cent of the test population. Expressed as milligrams of chemical per kilogram of air or water (mg/kg).

The lower the LD₅₀ and LC₅₀ values, the more toxic the chemical. For example, a chemical with an LD₅₀ value of 50 mg/kg is 10 times more toxic than a chemical with an LD₅₀ value of 500 mg/kg. It all means that extra precautions should be taken when handling chemicals with low LD₅₀ or LC₅₀ values.

Types of exposure fall into two categories:

Acute - This refers to major contact with or ingestion of the concentrated or diluted chemical. While standard procedures have been designed to avoid this possibility, accidents may occur. It is most important that one immediately wash the affected area, change contaminated clothing and get medical attention, if required.

Chronic - Chronic effects can be developed from continued absorption of a small dose of the pesticide over a long period of time. Chronic effects are characterized by the pesticide remaining in the body tissues and continually injuring some body process. In many respects chronic exposure may pose a greater danger to the operator than does acute poisoning since it is often unrecognized and untreated. Chronic low-level exposure results from wearing contaminated clothing and from breathing pesticide-laden air and from prolonged exposure to spray drift.

GENERAL SYMPTOMS OF PESTICIDE POISONING

In general, the symptoms which indicate that pesticide poisoning has occurred are as follows:

Mild poisoning - Note that mild symptoms may be the beginning of progression to severe symptoms: headache, fatigue, skin irritation, loss of appetite, dizziness, weakness, nervousness, nausea, excessive perspiration, diarrhea, eye irritation, thirst, restlessness, irritation of nose and throat, loss of weight, soreness of joints, changes of mood.

Moderate poisoning - Note that moderate symptoms may be the beginning of severe symptoms: nausea, trembling, muscular uncoordination, excessive salivation, blurring of vision, feeling of constriction in the throat and chest, difficulty in breathing, flushed or yellow skin, abdominal cramps, vomiting, diarrhea, mental confusion, twitching of muscles, weeping, excessive perspiration, profound weakness, rapid pulse, cough.

Severe poisoning - Vomiting, loss of reflexes, inability to breathe, uncontrollable muscular twitching, constriction of pupils to pinpoint size, convulsions, unconsciousness, severe secretion from respiratory tract, fever, intense thirst, increased rate of breathing.

If you think you have been poisoned - If you have been working with potentially poisonous pesticides, and if any of the general symptoms mentioned previously appear, **TAKE ACTION IMMEDIATELY:**

- Find a workmate, neighbor, member of your family or even a stranger and tell them that you suspect poisoning and give details.
- Even if poisoning is only suspected, go to see your doctor or call in at your local hospital for advice.
- Do not take any alcoholic drinks, pain killers or any other medicines.
- If contact with herbicides or other pesticides is known to have taken place, then the first aid procedures outlined below should be followed.

FIRST AID TREATMENT

Move well away from any pesticide. Quickly move the patient to safe uncontaminated surroundings, and remove any contaminated clothing.

If breathing is very weak or has ceased give artificial respiration. Oxygen can be beneficial. Seek medical attention.

If pesticides have been swallowed and if the patient has not vomited, induce vomiting immediately. Do this by introducing a finger into the throat, or by giving warm salt water (2 tablespoons of salt in a glass of warm water). Give cold water freely. Again induce vomiting if vomit fluid is not clear. Once vomit fluid is clear give patient milk or warm fluid to help dilute poison in body system.

Do not induce vomiting if the pesticide solvent is a petroleum distillate, such as fuel oil or kerosenes. Give liquids to dilute chemical if patient is conscious. Do not give anything by mouth to a person who is unconscious or having convulsions.

If pesticide has been splashed in the eye wash the eye with clean water immediately. Speed is essential to prevent injury to the eye. Use large amounts of clean water to gently irrigate the eye. Continue for at least 15 minutes.

If a pesticide has been spilled on the skin remove all contaminated clothing. Cover patient with clean clothing or a clean blanket immediately. Wash skin thoroughly with plenty of soap and water and repeat again. Clean under finger and toe nails. Wash contaminated skin with rubbing alcohol.

If respiration becomes weak or irregular give artificial respiration. Maintain breathing and prevent worsening of condition. Oxygen can be beneficial. Seek medical aid. Artificial respiration takes precedence over all other first aid.

If convulsions occur keep patient warm. Keep dry. Prevent injury. Use gentle restraint.

If unconsciousness occurs ensure patient can breathe adequately. You need to pull tongue forward to prevent blocking the throat, place patient on stomach, head slightly lower and turned to one side with mouth open. Keep patient warm and dry. **DO NOT GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.**

If you know the type of pesticide check the label and appropriate pesticide group for additional first aid information.

Obtain medical attention as quickly as possible.

PRECAUTIONS AGAINST EXPOSURE

In every instance of pesticide application, someone must assume responsibility. The operator should be sure that:

1. The least toxic but most effective pesticide is used.
2. Application is at the minimum effective rate and only on the target area.
3. Spray equipment is operated in such a manner that the wind or breeze is moving the spray cloud away from the applicator and away from any other sensitive plants or animals. Never let spray drift toward people or dwellings.

Personal Protection:

To reduce or eliminate physical contact with herbicides, it is necessary to wear adequate protective clothing, respirators, boots, goggles and gloves. In this guide, these items are referred to as "Standard protective equipment used when applying herbicides". The use of this equipment is essential for good health especially when applying some of the more toxic herbicides.

Respirators - Protection against inhalation (but not skin contact) is provided quite economically by the use of face mask respirators. Choose a mask that will fit your face and check with the company about the details of filters and chemical cartridges used in the respirator model. Note that full and half face masks cannot be worn securely by men with beards, whiskers, sideburns and moustaches. Instructions on the operational life and performance of filters and cartridges generally accompany the products. However, when carrying out spray operations, is it wise to change the filters each day and the cartridges should be replaced when chemical odor is noticed. Wash the face mask with warm water and soap before installing a new cartridge and filter. Do not store cartridges and filters in the chemical storage area, as they can absorb the chemical even when not in use.

Goggles - When a full face mask is not worn, the use of protective goggles is necessary and is recommended to protect the eyes from pesticide vapor, solids, and accidental splashes particularly. Safety supply companies offer a range of goggles. Many goggles are resistant to chemicals, some have specially treated lenses to reduce fogging, others have anti-fogging ventilation. Prescription type safety glasses are also available to which side shields can be attached.

Gloves - Non-absorbent gloves should be worn at all times while handling, mixing and applying pesticides. Neoprene has been found to be superior to rubber in resisting the penetration of pesticides. Other factors to be considered in selecting suitable gloves include sense of touch, wet grip, and cut and abrasion resistance. Gloves should not have fabric wristbands or lining and should fit properly. Always wash the glove inside and out after use. Leather gloves are not suitable.

Footwear - Non-absorbent footwear should be worn when applying pesticides. It is suggested that the most suitable boot is one that is knee length, acid and solvent resistant and ribbed to prevent slippage. Neoprene is considered much superior to rubber. Leather boots are not suitable.

Clothing - For general protection coveralls should be worn, along with gloves and a hat, to minimize the hazard of the skin absorbing pesticides. Clothing should be changed and washed regularly following spraying. You can now purchase disposable clothing that provides protection against exposure resulting from pesticide drift, splashing or spills. These garments (overalls, shirts and pants, head cover, and aprons) are light weight and cooler than rubber articles. Protective equipment and clothing are available from safety supply companies. Never use leather garments e.g. jackets, gloves, or shoes during the handling or application of pesticides. Leather can absorb the chemical and it is very difficult to decontaminate leather articles.

METRICS IN WEED CONTROL

Conversion Factors Common to Weed Control

(ha)	HECTARES = ACRES X 0.405
(L)	LITRES = IMPERIAL GALLONS X 4.55
(kPa)	KILO PASCALS = POUNDS PER SQUARE INCH X 6.9
(km/h)	KILOMETRES PER HOUR = MILES PER HOUR X 1.61

BENCH MARKS

16 hectares	= 40 acres
64 hectares	= 160 acres
450 litres	= 100 gallons
900 litres	= 200 gallons
1350 litres	= 300 gallons
200 kilo Pascals	= 29 pounds per square inch
250 kilo Pascals	= 36 pounds per square inch
275 kilo Pascals	= 40 pounds per square inch
300 kilo Pascals	= 43 pounds per square inch
4.8 km/h	= 3 mph
6.4 km/h	= 4 mph
8 km/h	= 5 mph
9.6 km/h	= 6 mph

STEP BY STEP EXAMPLE

Step 1
CONVERT YOUR FIELD SIZE TO METRIC
ACRES X .405 = HECTARES, EG. 40 ACRES x .405 = 16 HECTARES

Step 2
CONVERT SPRAYER TANK TO METRIC
GALLONS X 4.55 = LITRES, EG. 300 GALLONS X 4.55 = 1400 LITRES

Step 3
DETERMINE SPRAY VOLUME PER HECTARE (FROM LABEL)
NORMAL VOLUME WOULD BE 100 LITRES/ha

Step 4
SELECT YOUR SPEED FROM SPRAY CHART EG. 8002 NOZZLE SIZE
AT 275 kPa PRESSURE, At 9 km/h
OUTPUT = 100 LITRES/HECTARE

Step 5
CALCULATE SPRAY REQUIRED FOR FIELD
NO. OF HECTARES X SPRAY VOLUME HECTARE = LITRES OF SOLUTION
EG. 16 X 100 L/ha = 1600 LITRES
NOTE - YOUR TANK ONLY HOLDS 1400 LITRES SO WILL NOT DO THE WHOLE FIELD
IT WILL DO 1400 L/TANK = 14 ha, 100 L/ha


Step 6
MIX SPRAY. LITRES OF HERBICIDE (FROM LABEL) EG. 1.5 LITRES/ha
1.5 LITRES/ha X 14 ha = 21 LITRES
ADD CHEMICAL AND FILL TANK WITH WATER

Step 7 APPLY
A. SET PRESSURE GAUGE TO 275 kPa
B. DRIVE AT 9 km/h
AT THIS SPEED IT TAKES 5 min/20 sec TO TRAVEL 800 METRES (1/2 mile)

PREPARING TO CALIBRATE

Helpful Tables #1

SPRAY OUTPUT FOR SOME COMMON NOZZLES (METRIC MEASURE)

Nozzle Type		Pressure kPa	Litres per Hectare (L/ha) 50 cm Spacing			
Teejet	Delavan		6 km/h	8 km/h	9 km/h	10 km/h
6501	LF 1-65	250	72	54	48	43
8001	LF 1-80	275	75	56	50	45
		300	79	59	53	47
65015	LF 1.5-6.5	250	108	81	73	65
80015	LF 1.5-80	275	113	85	76	68
		300	118	89	80	71
* STANDARD NOZZLES						
6502	LF 2-65	250	144	103	97	86
8002	LF 2-80	275	151	113	100	90
		300	158	118	106	95
			8 km/h	100 cm Spacing		
				9 km/h	12 km/h	15 km/h
TK.75	D.75	200	36		24	19
		275	43		28	23
TK1	D1	200	32		26	
		275	38		30	
TK1.5	D1.5	200	48		39	
		275	57		45	
TK2	D2	200	64		52	
		275	76		60	

For nozzles or speeds not on this chart refer to manufacturers data or "A Guide to Field Sprayers"

Time to Travel 800 metres (½ mile)	
	km/hr
8 minutes	6
6 minutes, 52 seconds	7
6 minutes	8
5 minutes, 20 seconds	9
4 minutes, 48 seconds	10
4 minutes, 22 seconds	11
4 minutes	12

PREPARING TO CALIBRATE

Helpful Tables #2

APPLICATION VOLUMES OF FLAT SPRAY TIPS

Delavan	Nozzle	Tee Jet	Pressure kPa	Capacity mL/min.
LF1 - 65° or 80°		6501 & 8001	275	378
LF1.5 - 65° or 80°		65015 & 80015	275	566
LF2 - 65° or 80°		6501 & 8002	275	756
LF3 - 65° or 80°		6503 & 8003	275	1132
LF4 - 65° or 80°		6504 & 8004	275	1512

APPLICATION VOLUMES OF FLAT SPRAY LOW-PRESSURE TIPS

Nozzle	Pressure kPa	Capacity mL/min
800LP	100	370
80015LP	100	560
8002LP	100	740

APPLICATION VOLUMES OF FLOODING NOZZLE TIPS

Delavan	Nozzle	Pressure kPa	Capacity (mL/min)
	TeeJet		
D.75	TK.75	275	566
D 1	TK 1	275	775
D 1.5	TK 1.5	275	1132
D 2	TK 2	275	1512
D 2.5	TK 2.5	275	1888
D 3	TK 3	275	2264

TERMS USED IN WEED CONTROL

Post emergence application - The herbicide is applied to the crop and weeds after they emerge. Application may be made at a specified growth stage, as indicated on the label.

Pre-emergence application - The herbicide is applied to the soil surface after seeding the crop and before emergence of the weeds, unless otherwise instructed on the label. Normally these applications are made in 200 to 500 litres of water per hectare. In almost all cases, moist soil and moderate rainfall or sprinkler irrigation are necessary for best results.

Pre-planting application - The herbicide is applied to the soil surface and thoroughly incorporated to a depth of 5-7.5 cm before seeding the crop. Generally speaking, satisfactory results and crop safety when using soil-applied herbicides depend upon proper placement of the chemical in the soil. It is essential to read and understand label instructions regarding depth of incorporation equipment and depth of seeding.

Aerial Application of Herbicides - This describes the application of a herbicide from an aircraft flying over the area. Usually the herbicide is applied in the granular form or in a relatively low volume of carrier. Results depend upon efficiency of application, so it is essential the grower ensure that the aerial applicator he hires is fully experienced and licensed to apply herbicides for pay.

Herbigation - This describes the application of herbicides through an irrigation system.

Registered Mix - Mixtures of two or more products that have the same legal status as a registered product.

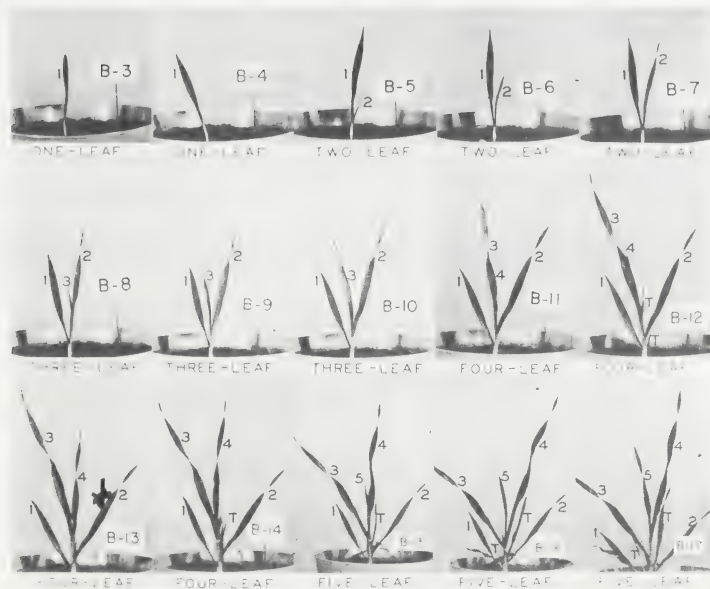
WHAT TO DO IF RESULTS ARE UNSATISFACTORY

1. Review your procedures, comparing them carefully with the label, to determine if an error was made.
2. Check equipment for worn nozzles, plugged screens, nozzles mixed as to type or size.
3. Recheck calibration, working back from acres covered and herbicide used.
4. If you determine that no error has been made, consider elapsed time since application. Some results are not apparent for several days. Look for early symptoms of the chemical taking effect. "Recognizing Herbicide Action and Injury" is a full color publication available from the University of Alberta bookstore for \$4.00, or you may see it at your district agriculture office.
5. If there is no apparent activity after a week report the matter to your chemical dealer and ask for technical help. At this time gather all relevant information, particularly evidence which may not be obtainable later. Photos or dried specimens may be helpful. Record weather conditions, rainfall, soil condition, crop variety, crop condition, quantity of material used, acres treated, etc.
6. Document your complaint in writing and retain a copy. If crop damage is involved you may wish to submit a specimen for diagnosis. Many disease or insect problems can resemble herbicide injury.
7. If the matter is still unresolved and unexplained obtain help from your district agriculturist.

LEAF STAGES OF CEREAL CROPS

Good weed control, with a minimum of crop injury, depends upon the application of chemicals at the proper growth stage of the crop. The most satisfactory means of measuring the growth stage of cereals is by the leaf stage. The pictures below will aid you in deciding the correct stage at which cereals should be sprayed.

Leaf Stages of Barley (Wheat and Oats are similar)



These photographs were supplied by the late Mr. H.A. Friesen (C.W.C. Leaf Stage Committee), Head, Crop Management and Soils Section, C.D.A. Research Station, Lacombe, Alberta.

AATREX (atrazine)

1. **FORMULATIONS:** Atrazine is available from Ciba-Geigy as various formulations:
Aatrex 90W (90% wettable powder, 2 kg bags)
Aatrex Nine-O (90% wettable powder, 4.5 kg bags)
Aatrex Plus (400 g/L, 20 litre containers)
Aatrex liquid (500 g/L, 20 litre containers)

2. **REGISTERED MIXES:** There are no registered mixes with Aatrex Plus.

The following registered mixes can be recommended.

Aatrex liquid or Aatrex Nine-O or Aatrex 90W + Booster plus (emulsified oil)
Aatrex liquid or Aatrex Nine-O or Aatrex 90W + nitrogen solutions or complete liquid fertilizers.
Aatrex liquid or Aatrex Nine-O or Aatrex 90W + Dual CibaGeigy
Aatrex liquid or Aatrex Nine-O or Aatrex 90W + Lasso

3. **CROPS:** Corn (silage, field and sweet).

4. **WEEDS CONTROLLED:** A wide range of annual grasses and broadleaf weeds such as: barnyard grass, buckwheat (wild), clover (volunteer), foxtail (green and yellow)*, lamb's quarters, mustards, pigweed (redroot), purslane, ragweed, smartweeds (annual), wild oats

* Foxtail is best controlled by a post-emergent treatment or pre-plant incorporated, tank mixed with Dual Ciba-Geigy

5. **WEEDS SUPPRESSED:** None

6. **WHEN USED:** Pre-plant treatment
Pre-emergent treatment
Post-emergent treatment

The above methods of application may be employed with Aatrex Nine-O, Aatrex 90W and Aatrex liquid. Aatrex plus is designed mainly for post emergent use but may be applied as a pre-emergence spray after the corn has been planted.

7. **HOW TO APPLY:**

With: Ground equipment
Rate: a) Aatrex liquid 3.25-6.75 L/ha. When used with emulsified Aatrex liquid 3.25-4.5 L + 17 L of emulsifiable crop oil in 150-300 L/ha of water.
b) Aatrex 90W and Aatrex Nine-O apply at the rate of 2.0-3.75 kg/ha.
c) Aatrex Plus: 4.25-8.5 L/ha.
Water Volume: 200-300 L/ha
Incorporation: If tillage is intended after spraying do not incorporate deeper than 2.5 cm.
Pressure: 200-300 kPa
Ground Speed: No restrictions specified
Nozzles: Those capable of delivering 200-300 L/ha in a low to medium range pressure and achieving uniformity of spray application.
Protective Equipment: Standard protective equipment used when applying herbicides.

8. **SPRAYING TIPS:**

- a) Do not mix oils, oil concentrates or surfactants or hormone type herbicides with Aatrex/Bladex or Aatrex/Lasso.
- b) When mixing Aatrex to other herbicides add the Aatrex to the spray tank first then add either Bladex or Lasso or Sutan directly but slowly to the tank. Agitate thoroughly before applying.
- c) Always keep Aatrex or mixtures thereof well agitated.
- d) Avoid excessive agitation especially where Aatrex and oil mixtures are involved. Excessive agitation can cause Aatrex and oil mixtures to form a grease-like mass and settle to the bottom of the tank.
- e) The by-pass line should discharge at the bottom of the spray tank.
- f) Do not use strainers smaller than 50 mesh. Felt filters must be changed and metal filters substituted.

9. **HOW IT WORKS:** The Triazine herbicides are potent inhibitors of the Hill reaction, ie, they are photosynthetic inhibitors. Triazines also affect uptake of nutrients and changes in the nitrogen metabolism seem to occur.
10. **EXPECTED RESULTS:** Failure of weeds to emerge or depending on weather conditions weeds may die back soon after emergence.
11. **EFFECT OF RAINFALL:** Average to moderate rainfall can enhance performance. Very heavy rainfall on sandy soils can cause some leaching and thus a decrease in efficiency.

12. **MOVEMENT IN SOIL:** Very negligible unless excess moisture is associated with a very sandy soil.
13. **CROPPING AND GRAZING RESTRICTIONS:** Where Aatrex is used corn should be followed by corn. Avoid drift onto susceptible crops or neighbouring soil during application.
14. **TOXICITY:** Acute Oral LD₅₀ (active ingredient) - albino rats 3080 mg/kg
Acute Oral LD₅₀ (active ingredient) - mice - 1750 mg/kg

The results of a repeated insult patch test (Shelanski technique) in 50 human subjects showed that Atrazine was neither a primary irritant nor a fatiguing agent and did not produce sensitization in any of these subjects.

15. **SAFETY AND PRECAUTIONS:**

Symptoms of Poisoning: No symptoms of poisoning have been reported in man from the ingestion of Atrazine. When very large doses of Atrazine 90W (3.0-10.2 gm/kg) were administered to rats the following symptoms were observed: muscular weakness, hyperactivity, ptosis, dyspnea and prostration.

Treatment (Physician): If atrazine is ingested accidentally, there is no specific antidote. Induce emesis or lavage stomach. Give a saline laxative and supportive therapy.

First Aid: In case of contact with skin, wash with soap and water. In case of contact with eyes, flush with plenty of water for at least 15 minutes and get medical attention.

16. **STORAGE:** The flowable formulations should be kept from freezing. If stored in unheated areas the product should be warmed and agitated thoroughly prior to using.
17. **WHERE AVAILABLE:** All Green Cross Dealers. (Atrazine formulations are also available from dealers carrying Fisons' brands)

Additional information available from:

Green Cross Products
820 - 26 Street N.E.
Calgary, Alberta
T2A 2M4
Phone: (403) 273-5656

AFOLAN F (linuron)

1. **FORMULATION:** Dispersion formulation containing 450 g/L linuron.
Available in 10 litre containers.

2. **REGISTERED MIXES:** Afolan F + MCPA amine.

Mixing Restrictions: Afolan F is a special formulation of linuron.
Carefully follow mixing instructions.

1. Fill the sprayer half full with clear water.
2. Shake the sealed Afolan F container vigorously.
3. Slowly add Afolan F to the sprayer tank while the bypass or jet agitator is operating.
4. Empty the Afolan F container completely letting it drain in a vertical position for 30 seconds.
5. Add enough rinse water so that the container is one-fifth to one-quarter full.
6. Shake container vigorously, then pour into tank and drain for 30 seconds.
7. Repeat this rinse procedure three times to ensure that all the Afolan F has been transferred to the sprayer tank.
8. Finish filling tank after the rinsing procedures.

CAUTION: To avoid settling in sprayer tank, spray Afolan F solution as soon as possible after mixing.

3. **CROPS:** Use Afolan F + MCPA amine 500 tank mix on wheat, barley and oats. Use Afolan F alone in asparagus, carrots, parsnips and shelterbelts.

Underseeding: Do not use on crop underseeded to forage crops.

4. **WEEDS CONTROLLED:** Buckwheat (tartary and wild), chickweed, corn spurry, cow cockle, goosefoot, groundsel, hemp-nettle, knotweed, kochia, lamb's-quarters, mustard (wild and wormseed), pigweed, purslane, ragweed, shepherd's-purse, smartweeds (annual), sow thistle (annual), stinkweed, stork's-bill, wild radish.

5. **WEEDS SUPPRESSED:** Field horsetail. Suppression of green foxtail if applied when foxtail is in the 1-3 leaf stage.

6. **WHEN USED:**

Wheat, barley or oats - apply when crop is in 2-4 leaf stage and weeds in 1-4 leaf stage.

Asparagus - apply before spear emergence or after last cutting.

Carrots - apply when crop has 2 or more fully developed leaves and before annual grasses are taller than 5 cm and broadleaved weeds taller than 15 cm.

Parsnips - apply when crop has 2 or more fully developed leaves.

Shelterbelts - apply before weeds emerge or before they are 10-15 cm tall. Wait 10 days after tree transplanting before application. Once leaf buds open, apply as a directed spray.

7. **HOW TO APPLY:**

With: Ground equipment

Rate: Wheat, barley and oats: Apply 0.47 - 0.62 litres of Afolan F and 1.12 litres of MCPA per hectare. Use the lower rates of Afolan F when growing conditions and rainfall are above average.

Asparagus: 3.7 - 5.0 L/ha Afolan F.

Carrots and Parsnips: 1.9 - 5.0 L/ha Afolan F. Use lower rates on small seedling weeds and the higher rates on larger established weeds.

Shelterbelts: 5.0 - 10.0 L/ha Afolan F (at 0.47 L/ha rate of Afolan F, one 10 litre container will treat 21.3 ha).

Water Volume: Wheat, barley, oats - 100 L/ha

Asparagus, carrots, parsnips - 200-300 L/ha

Shelterbelts - 300 - 500 L/ha

Pressure: 275 kPa. A pump of sufficient capacity to provide adequate volume through the bypass and/or jet agitation system must be used. This will prevent settling out while spraying.

Ground Speed: 9 km/h

Nozzles: 80° flat fan nozzles. Use 50 mesh or larger line strainers or screens.

Protective

Equipment: The use of protective clothing and eye equipment is recommended.

8. **SPRAYING TIPS:** Avoid overlapping and shut off spray booms while starting, turning or stopping. Never apply if crop is under stress due to drought or recent frost. Use only the amine formulation of MCPA. While some crop yellowing may be observed, it will be rapidly outgrown and should not affect yield or maturity.

9. **HOW IT WORKS:** Linuron is a systemic herbicide with some contact herbicide properties. It is absorbed through both the foliage and the root system of the plant. Once in the plant, its mode of action is to strongly inhibit photosynthesis. MCPA is translocated and causes rapid undifferentiated growth which usually results in death of susceptible plants.

10. EXPECTED RESULTS:

When linuron is mixed with MCPA amine, there is evidence of urea and phenoxy activity. The initial effect of linuron is leaf-tip necrosis beginning on the older leaves. This is followed by a water soaked wilted appearance, progressive yellowing, stem collapse and eventual browning and plant death. MCPA has the effect of promoting unequal rates of elongation in the stem, petiole and leaf margin causing bending, twisting and leaf cupping.

Crop: Linuron - MCPA injury to cereals consists of chlorosis and tip browning, particularly on the older leaves.

Conditions under which poor results may be expected:

1. Early or late application, or application of greater than recommended rates.
2. Application while plant is under stress.
3. Fields retreated with Afolan during same crop year.

11. **AFFECTS OF RAINFALL:** Do not apply if rain is expected within 1 hour.

12. **MOVEMENT IN SOIL:** Higher rates of Afolan and extreme moisture conditions may cause some leaching.

13. **GRAZING AND CROPPING RESTRICTIONS:** Do not graze or feed green plants to livestock.

14. **TOXICITY:** Afolan F is a safe herbicide to use. Usual safety precautions should be followed when using this herbicide.

Fish and Wildlife: Rat oral LD₅₀ - 1500 mg/kg
Rainbow Trout LC₅₀ - 16 ppm for 96 hrs.

Toxicity to skin: Applications of linuron to intact and abraded skin were mildly to moderately irritating but did not produce allergic skin sensitization.

15. SAFETY AND PRECAUTIONS:

First Aid: If swallowed, induce vomiting and take patient to nearest hospital taking the labelled container and attached pamphlet with you.

16. **STORAGE:** Afolan F cannot be stored below freezing. If stored for one year or longer, shake well before using.

17. **WHERE AVAILABLE:** Alberta, Manitoba and Saskatchewan Wheat Pools, United Grain Growers, Pioneer Grain, Federated Co-operatives, Cargill Grain, Niagara Chemicals and Pfizers.

Additional information available from:

Hoescht Canada Inc.
645 Park Street
Regina, Saskatchewan
S4N 5N1
Phone: (306) 545-8166

AMIBEN (chloramben)

1. FORMULATIONS: Water soluble solution, 240 g/L
Available in 20 litre containers
2. REGISTERED MIX: Amiben & Treflan - Only the mix is registered for use on sunflowers.

Mix Restrictions: None

Mixing with other pesticides: Not recommended

3. CROPS: Sunflowers

Underseeding: Not recommended

4. WEEDS CONTROLLED: Chickweed, foxtail (green and yellow) lamb's-quarters, pigweeds, ragweed, smartweed (annual), wild mustard.
5. WEEDS SUPPRESSED: None
6. WHEN USED: Pre-plant incorporated
7. HOW TO APPLY:

With: Ground equipment

Rate: 9.25 L Amiben per ha plus 2.75 L Treflan per ha on medium to heavy soils or 2.0 L Treflan per ha on light soil. (One 20 L container of Amiben treats 2.16 ha at 9.25 L/ha rate).

Water Volume: 100 L/ha

Incorporation: Incorporate the chemicals immediately and thoroughly into the soil in two directions. The first incorporation should be done within 8 hours of application. The second application should be done at right angles of the first incorporation. Set all implements to cut 8.0 to 10.0 cm deep.

Pressure: 275 kPa

Ground Speed: Operate disc implements at 6-10 km/h, cultivators 10-13 km/h.

Nozzles: No restriction

Protective

Equipment: Standard protective equipment used when applying herbicides.

8. SPRAYING TIPS:

- should not be incorporated with a field cultivator when the soil is crusted, lumpy, or too wet for good mixing action.
- incorporation with implements set to cut less than 8.0 cm deep or more than 10.0 cm deep may result in erratic weed control.
- rod weeders, harrows or hoe drills will not provide proper incorporation.
- seed within one week of application for best results.

9. HOW IT WORKS: Amiben requires moisture for activation. Amiben inhibits root development of seedling weeds.

10. EXPECTED RESULTS:

Wild Mustard and stinkweed: Affected seedlings will not emerge from the ground. Control of cruciferous species will last for at least 6-8 weeks following treatment.

Sunflowers: No tolerance problems exhibited.

Conditions under which poor results may be expected:

1. Application and incorporation when soil surface is wet.
2. Inadequate soil incorporation or the use of improper incorporation equipment.
3. Less than the recommended rate.

11. EFFECT OF RAINFALL: In light soils a heavy rainfall may wash Amiben below the root zone of germinating weed seeds.

12. MOVEMENT IN SOIL: Water soluble.

13. GRAZING AND CROPPING RESTRICTIONS:

Drift: Non-volatile

Grazing Restriction: Not applicable

Crop Use after Hail: Not applicable

Succeeding crops: No restrictions

14. TOXICITY:

Fish and Wildlife: Not toxic to fish or wildlife when used as directed.

Acute toxicity: Oral LD₅₀ (rats) - 3500 mg/kg.

Chronic toxicity: Rats and dogs - 2 years, no effect at 10,000 ppm in total diet.

Mild to moderate dermal irritation; no evidence of systemic toxicity. No symptoms of poisoning ever experienced.

15. SAFETY AND PRECAUTIONS: Harmful if swallowed. Avoid contact with skin, eyes, and clothing.

16. STORAGE: Do not freeze. Store in heated area. If freezing occurs store in a warm room at 10-27°C for several hours and agitate thoroughly before using to ensure all crystals are dissolved.

17. WHERE AVAILABLE: United Grain Growers, Pioneer, Cargill.

Additional information available from:

Allied Chemical Services Ltd.

5507 - 1 Street S.E.

Calgary, Alberta

T2H 1H9

Phone: (403) 253-8471

AMITROL-T (Amitrole)

1. FORMULATIONS: Water soluble solution, 200 g/L
Available in 1 and 10 litre containers
2. REGISTERED MIXES: None
Mix Restrictions: Not applicable
Mixing with other pesticides: Not recommended
3. CROPS: Corn, soybeans, white beans, post harvest grains, peas, alfalfa and clover, apple orchards and asparagus. Spot treatment only (see item 6)
Underseeding: Not recommended.
4. WEEDS CONTROLLED: Canada thistle, cattails, hoary cress, horsetail, leafy spurge, milkweed, poison-ivy, quackgrass, sow-thistle (perennial), toadflax, white ash, other perennials and most annuals.
5. WEEDS SUPPRESSED: None
6. WHEN USED:

Weeds: Canada thistle, Perennial sow-thistle - spray when most thistles are in the late bud to bloom stage. If possible, till treated area 2-3 weeks following treatment.

Quackgrass: apply when 15-20 cm tall, till about 3 weeks following treatment.

Hoary cress: Spray during advanced rosette and bud stages.

Leafy spurge: Spray between the advanced flowering and seed stage.

Toadflax: Treat during advanced rosette prebud stage.

Others: see label copy.

Crops: Not to be used in crop, non-selective. See label copy for pre-planting or post harvest treatment.

7. HOW TO APPLY:

With: Ground equipment

Rate: Rate varies depending on perennial weed problem present, generally 22-35 L/ha (see label for specific details). (At 22 L/ha rate, one 10 L container will treat 0.45 ha).

Water Volume: In dry areas, apply in a minimum of 200 litres of water.

Incorporation: Not applicable.

Pressure: 150-275 kPa

Ground Speed: Adjust ground speed according to desired application rate.

Protective

Equipment: Standard protective equipment used when applying herbicides.

8. SPRAYING TIPS: Good coverage is essential for complete control. **Spray to point of plant runoff.**

9. HOW IT WORKS: Amitrol-T is a systemic herbicide which works on the chlorophyll of plant therefore the weeds turn white and die slowly. Amitrol-T moves throughout the plant including the root system.

10. EXPECTED RESULTS:

Perennial Weeds: Weeds should start to turn white within 7-14 days of application depending on growing conditions.

Crops: Not applicable.

Conditions under which poor results may be expected:

1. Inadequate spray coverage and rate of application
2. When plants are drought-stressed or overmature
3. Heavy rains within 12 hours of application
4. Tillage too soon after application (wait 2-3 weeks before cultivating treated areas).

11. EFFECTS OF RAINFALL: Heavy rains within 10-12 hours of application may reduce the effectiveness.

12. MOVEMENT IN SOIL: Not applicable

13. GRAZING AND CROPPING RESTRICTIONS:

Drift: Most crops if contacted by spray drift are sensitive.

Grazing Restriction: Do not graze until six months following treatment.

Crops use after Hail: Not applicable

Succeeding Crops: Consult label.

14. TOXICITY:

Fish and Wildlife: Not toxic to fish or wildlife when used as recommended.
Acute Toxicity: Oral LD₅₀ (rats) 24,600 mg/kg.

15. SAFETY AND PRECAUTIONS:

First Aid: Minimal dermal irritation of skin. If on skin, wash thoroughly with soap and water. If in eyes, flush immediately with clean water. Seek medical attention. If ingested - induce vomiting, seek medical attention.

16. STORAGE: Store container away from any place where temperature may reach 50°C. Do not store below 4°C. If freezing occurs contents will crystallize. Store in a warm room or in the sun at 10-27°C, with frequent agitation and confirm contents are liquified before using. There is no shelf life limitation.

17. WHERE AVAILABLE: United Farmers of Alberta, United Grain Growers, Federated Co-operatives Limited, Oliver Industrial Supply, Alberta Wheat Pool, Pioneer Grain, Cargill, Niagara Dealers

Additional information available from:

Allied Chemical Services Ltd.
5507 - 1 Street S.E.
Calgary, Alberta
T2H 1H9
Phone: (403) 253-8471

AMIZINE (Amitrole & Simazine)

1. FORMULATIONS: Aqueous solution,
Amitrole 53 g/L
Simazine 106 g/L
Available in 20 litre containers

2. REGISTERED MIXES: None recommended

Mix Restrictions: Shake container before using.

- A. Where hose water under pressure is available: Fill tank about one-third with water. Pour in contents of Amizine container. Mix by stirring contents with agitation in the tank.
B. Where hose water under pressure is not available, or for mixing less than a tankful: Pour 4 litres Amizine into a 20 litre bucket. Add water to make 20 litres. Stir, pour into tank. For preparing less than 20 litres of spray, mix Amizine and water in a separate container according to table under Amount to Use. Pour into tank.

Mixing with other Pesticides: Not recommended.

3. CROPS: Industrial sites and other non-cropped areas, nurseries, ornamental plantings, Christmas tree plantations, forest and shelterbelt plantings: American beech, American elm, Arborviate (thuja), Chinese elm, dogwood, Douglas fir, eastern hemlock, Japanese holly, Japanese maple, juniper, London plane tree, Norway spruce, red pine, red spruce, Scotch pine, silver maple, viburnum, white ash, white spruce and yew (taxus).

Underseeding: Not applicable.

4. WEEDS CONTROLLED: Some of the weeds controlled are: blue grass, Canada thistle, chrysanthemum weed, dandelion, green foxtail, kochia, lamb's-quarters, nightshade, pigweed, quackgrass, ragweed, smartweed, sow-thistle, plantain, purslane, wild oats.

5. WEEDS SUPPRESSED: Not applicable.

6. WHEN USED: Apply Amizine in spring and early summer, before weeds are 8 to 20 cm tall.

7. HOW TO APPLY:

With: Amizine may be applied with a Meter-Miser, high volume ground sprayer or knapsack sprayer.
Rate: High volume ground sprayer: mix 85 litres of Amizine per hectare. Knapsack sprayer: 0.8 L of Amizine per 100 sq. metres.
Water Volume: High volume ground sprayer 500 L/ha. Knapsack sprayer 8 to 12 litres for 100 sq. metres.
Incorporation: Not applicable
Pressure: 275 kPa
Ground Speed: Adjust ground speed according to desired application rate.
Nozzles: Use a Tee-Jet 8002 or larger fan type nozzle or its equivalent.
Protective Equipment: Standard protective equipment used when applying herbicides.

8. SPRAYING TIPS: Screens in nozzles as well as those in the suction and lines should be no finer than 50 mesh size.

9. HOW IT WORKS: Liquid Amizine works on the chlorophyll of plants, therefore the weeds turn white and die slowly. Amizine moves throughout the plant, including the root system. The simazine portion of the herbicide will remain in the soil and is absorbed by the roots of germinating weed seeds, thus resulting in short term residual control.

10. EXPECTED RESULTS: Treated weeds start to turn white or brown in 7-14 days and are usually dead in about three weeks. Area treated should remain free of vegetation for one season.

11. EFFECTS OF RAINFALL: Rainfall will carry the chemical into the root zone of the vegetation.

12. MOVEMENT IN SOIL: Amizine will stay near the surface of the soil as it is adsorbed to the soil particles. It resists leaching or downward movement by rainfall.

13. GRAZING AND CROPPING RESTRICTIONS:

Drift: Lilac, privet, honeysuckle and barberry are susceptible to this mixture and may be injured if contacted by spray.
Grazing Restrictions: Not applicable.

14. TOXICITY:

Amitrole: Acute toxicity: Oral LD₅₀ (rats) 24,600 mg/kg
Simazine: Acute toxicity: Oral LD₅₀ (rats) 5,000 mg/kg

15. SAFETY AND PRECAUTIONS:

Amitrole:

First Aid: Minimal dermal irritation of skin. If on skin, wash thoroughly with soap and water. If in eyes, flush immediately with clean water.

Simazine:

First Aid: No cases of poisoning in man have been reported. If ingested accidentally, induce emesis or gastric lavage. Give a saline laxative and supportive therapy.

16. STORAGE: Store in dry, heated area. Keep from freezing. If freezing occurs, warm the drum in a warm room or sun, with frequent agitation, until all crystals are dissolved.

17. WHERE AVAILABLE: Allied Chemical Services Ltd.

Additional information available from:

Allied Chemical Services Ltd.
5507 - 1 Street S.E.
Calgary, Alberta
T2H 1H9
Phone: (403) 253-8471

ASULOX F (asulam)

1. **FORMULATIONS:** Water soluble solution, containing 400 g active ingredient/litre.
Available in 20 litre containers.

2. **REGISTERED MIXES:** Asulox F + Buctril M (Flax)
Asulox F + Embutox E (seedling and established alfalfa).

Mix restrictions: Add Asulox F to the spray tank first.

3. **CROPS:** Flax, seedling and established seed alfalfa.

Underseeding: Flax underseeded with alfalfa only.

4. **WEEDS CONTROLLED:** Wild oats

5. **WEEDS SUPPRESSED:** Green foxtail, volunteer oats, barley and wheat, barnyard grass, bluebur, wild mustard, stinkweed, wild buckwheat, annual smartweeds.

6. **WHEN USED:** 2-4 leaf stage of wild oats and when flax plants are 2.5-15 cm high or alfalfa plants beyond the first trifoliate leaf stage.

7. **HOW TO APPLY:**

With: Ground equipment, not floater.
Rate: 2.75 L/ha (one 20 L container will treat 7.25 ha).
Water Volume: 50-100 L/ha
Pressure: 275 kPa
Ground Speed: 9 km/h
Nozzles: All standard nozzles delivering 50-100 L/ha. Floodjet-type tips are not recommended.
Protective Equipment: Standard protective equipment used when applying herbicides.

8. **SPRAYING TIPS:**

- Floodjet-type tips are not recommended.
- Do not spray unthrifty crops or when flax is under stress due to drought or excess soil moisture. DO NOT spray in hot, humid weather conditions.
- Avoid spraying if rain is expected within 8 hours.
- Do not spray when crop is wet or heavy with dew.

9. **HOW IT WORKS:**

Asulox F is a systemic herbicide which can be taken up by leaves of sensitive plants and translocated to other parts of the plant. It exerts its main effect by inhibiting the process of cell division in the growing points of the plant and greatest visual effects, therefore, occur in new growth. Signs of action are severe yellowing of new leaves, stunting and finally death of the plant. Growing points are killed within one to two weeks but mature leaves present at spraying die slowly.

10. **EXPECTED RESULTS:**

Wild Oats: Should start to yellow about one week after application. Wild oat plants not at the recommended growth stage or those that emerged after spraying will be unaffected.

Crop: Temporary slight yellowing of the flax leaves may be seen a few days after spraying. Crop recovery from wild oat competition may be slow if the weeds have been allowed to smother the flax. Some check to crop height and possible delay in maturity may be noticed.

Conditions under which poor results may be expected:

1. Rain within 8 hours.
2. Wrong spray volume and ground speed.
3. Wrong timing of wild oat growth.
4. Spraying when foliage is wet with dew.
5. Spraying when flax is under stress or spraying in hot, humid weather.

11. **EFFECTS OF RAINFALL:** Rainfall within 8 hours may seriously affect activity.

12. **MOVEMENT IN SOIL:** Not applicable.

13. **GRAZING AND CROPPING RESTRICTIONS:**

Drift: Danger from drift is low, cereals can be affected.

Grazing restrictions: Do not graze or feed crop.

14. TOXICITY: Fish and Wildlife: Rat LD₅₀ - 5000 mg/kg (acute oral)
Bees: Non toxic.
15. SAFETY AND PRECAUTIONS: Wash concentrate from skin or eyes immediately, avoid breathing spray mist.
16. STORAGE: Store in heated area. Crystals will form if stored below freezing and whole mixture will freeze. Crystals can be redissolved by rolling pail on side in a warm place.
17. WHERE AVAILABLE: Alberta Wheat Pool, Federated Cooperatives, Cargill Grain, Pioneer Grain, Oliver, Pfizer.

Additional information available from:

May & Baker Canada Inc.
323, 1147 - 17 Avenue S.W.
Calgary, Alberta
T2T 0B7
Phone: (403) 245-3148

AVADEX BW (triallate)

1. FORMULATION: Emulsifiable Concentrate: 400 g/litre (22.7 litre pail)
Granular 10% (22.7 kg bags)
2. REGISTERED MIXES: Avadex BW + Treflan
Avadex BW + Liquid Fertilizers
Avadex BW + Granular Urea Fertilizer
Avadex BW + Treflan + Liquid Fertilizers

Mix Restrictions: Thorough and uniform mixing is required.

Mixing with other Pesticides: Not recommended.

3. CROPS: Spring wheat, durum wheat, barley, flax, rapeseed, peas, mustard.

Underseeding: Forage legumes such as alfalfa, clovers, and trefoil may be seeded with labelled crops treated with Avadex BW herbicide, provided the legumes are not harvested for green crop, silage or hay in the year of seeding.

4. WEEDS CONTROLLED: Wild oats

5. WEEDS SUPPRESSED: None

6. WHEN USED:

Spring - Pre-plant incorporated on barley, rapeseed, flax, peas, mustard.

- Post-plant incorporated on spring and durum wheat.

Fall - All crops

7. HOW TO APPLY:

With: Aircraft (granules only) or ground equipment
Rate: Crops

Spring Applications

	Liquid (L/ha)	Granules (kg/ha)
Spring or durum wheat	3.5	15
Barley	4.25	15-17.5
Flax, rapeseed, peas, mustard	4.25-5.5	17.5-22.5

Fall Applications

	Liquid (L/ha)	Granules (kg/ha)
Spring or durum wheat	3.5-4.25	15-17.5
Barley	4.25	15-17.5
Flax, rapeseed, peas, mustard	4.25-5.5	17.5-22.5

Water Volume: Liquid only - minimum of 100 L of water/ha

Incorporation: Time - Incorporate liquid immediately following application

- Incorporate granules within 48 hours following application

Implements - A double disc or light duty cultivator followed by harrows should be used for pre-plant incorporated treatments.

- Heavy duty harrows in good condition must be used for postplant incorporated treatments. Harrows similar to the following are recommended

- Allied model #X6121 four bar spring tooth harrows (150 cm width weighing 68 kg per section)

- Allied models #40 or #60 parallel bar diamond tooth harrows (#40 weighs 28 kg per section, #60 weighs 44 kg per section and are 100 and 150 cm widths respectively).

Pressure: Liquid only - 200 kPa

Nozzles: All fan type nozzles delivering 100 L/ha

Protective

Equipment: To avoid contact with skin or eyes, wear rubber gloves and goggles when handling or spraying.

8. SPRAYING TIPS:

- Equipment should be operated at 9 km/h
- Double discs and cultivators should be set to a depth of cut up to 7.5 cm in order to distribute the herbicide in the upper 5 cm of soil
- The herbicide must be uniformly incorporated into the top 5 cm of soil
- Incorporation under excessively moist soil which hinders thorough mixing of the soil is not recommended
- Straw, lumps of soil, or other materials which are dragged by harrows will cause uneven incorporation resulting in reduced wild oat control
- On stubble, incorporate with a double disc or cultivator implement followed at right angles by a harrow operation
- On summerfallow or level plowed ground, two harrow operations at right angles may be adequate if the soil is loose and free of trash and lumps

- Incorporation of the Avadex BW/urea combination is recommended as follows:
 - Spring - On all labelled crops except wheat. Two operations immediately following application at right angles to each other with a delay of 24 hrs. between incorporations. A vibra-shank or light duty field cultivator is the preferred incorporation implement.
 - Fall - On all labelled crops. Fall applications should be immediately followed by one shallow incorporation with a double disc or cultivator followed in the spring prior to seeding by a shallow cultivation at right angles to the fall operation.
 - Seeding operations which leave deep ridges, as is the case with many hoe-drills, should be followed by a harrow operation to control wild oats emerging in the drill rows.
9. HOW IT WORKS: Applied prior to germination, Avadex BW is absorbed by wild oat shoots, usually resulting in death before emerging through the soil surface. Occasionally (particularly under dry conditions), some wild oats may emerge and reach the 3 or 4 leaf stage before dying from their intake of Avadex BW.
10. EXPECTED RESULTS:
- Wild oats:** The major effects of Avadex BW on wild oats are evident before they emerge through the soil surface. Scraping away the top 1.5-2.5 cm of soil 1 to 2 weeks following treatment and/or seeding will expose white to yellow colored wild oat shoots 2.0-2.5 cm in length with pinched tips. These shoots are essentially dead and will decay, plants which have emerged and absorbed a lethal dose of Avadex BW will display a protrusion of the growing shoots through the lower stem of the wild oat plant. Under dry soil conditions, a timely rainfall of 1.5 cm or more when wild oats are emerging, can cause post-emergent die-back of a high percentage of wild oat plants on most soil types.
- Crop:** Wheat seeded into the treatment zone under very dry soil conditions may be thinned and delayed when germinating and emerging just prior to a heavy rainfall. Wheat must be seeded at least 1.5 cm below the treated layer of soil (eg. 5 to 7.5 cm). This will serve as substantial protection against the possibility of crop thinning.
- Conditions under which less than satisfactory results may be expected:**
1. Incomplete incorporation due to wet, cloddy soil, or heavy trash.
 2. Incorporation delayed
 3. Very dry soil conditions
 4. Disruption of the Avadex BW treated layer of soil, such as the seed drilling operation, which may leave seed drill ridges in which wild oats can emerge.
 5. Equipment deficiencies such as too light harrows.
11. EFFECTS OF RAINFALL: Required for activation of Avadex BW by keeping the treatment layer in a moist condition. Rainfall immediately following application and before incorporation may result in reduced wild oat control due to loss of Avadex BW into the atmosphere.
12. MOVEMENT IN SOIL: Negligible
13. GRAZING AND CROPPING RESTRICTIONS:
- Drift:** No effect on standing crops
Grazing Restrictions: None
Crop use after hail: No restrictions
Succeeding Crops: Oats should not be seeded into soil treated with Avadex BW in the previous year.
14. TOXICITY:
- Oral LD₅₀ Rats - 1675 to 2165 mg/kg Dogs - Greater than 20 g/kg
 Skin absorption LD₅₀ for rabbits - 2225 to 4050 mg/kg
 When applied to human skin (repeated insult patch test), it was neither a primary irritant, skin fatiguing agent, nor a sensitizer.
15. SAFETY AND PRECAUTIONS: Combustible. May cause skin and eye irritation. May be harmful if swallowed.
- First Aid:** In case of contact, immediately wash skin with soap and plenty of water; for eyes, flush with plenty of water for at least 15 minutes and get medical attention. This product contains petroleum distillate. If swallowed, **do not** induce vomiting. Call a physician.
16. STORAGE: Store above 0°C to keep from freezing. Freezing will result in crystals which settle to the bottom of the can. If allowed to freeze, place in a warm room (22°C or higher) and roll and shake the can frequently for several days to redissolve.
17. WHERE AVAILABLE: Alberta Wheat Pool, Cargill Grain, Green Cross, United Grain Growers, Pfizer Chemicals, Federated Cooperatives Ltd., Pioneer Grain Co. Ltd.
- Additional information available from:**
- Monsanto Canada Inc.
 #23, 1313 Border Street
 Winnipeg, Manitoba
 R3H 0X4
 Phone: (204) 632-1278
- In case of an emergency involving a Monsanto herbicide call the following number collect at any time, phone 1-314-694-4000.

AVENGE 200-C (difenzoquat)

1. FORMULATIONS: Water soluble solution 200 g/L
Available in 20 litre containers
2. REGISTERED MIXES: Avenge + Torch or Pardner
Avenge + Buctril M or Brominal M
Avenge + 2,4-D or MCPA Ester

Mix Restrictions: Add broadleaved herbicide when tank ¼ full of water and Avenge when tank ¾ full; circulate for 5 minutes before spraying.

Mixing with other Pesticides: Not recommended.

3. CROPS: Barley, spring wheat, durum wheat (exclusions: Canuck, Chinook, Manitou, Park, Sinton, Thatcher, Pitic 62, Coulter, Hercules, Wakooma, Wascana, Norstar, Sundance, Winalta)

Underseeding: Not recommended.

4. WEEDS CONTROLLED: Wild oats

5. WEEDS SUPPRESSED: None

6. WHEN USED:

- 3-5 leaf stage of the wild oats; wild oats at the 2 leaf stage and younger are not controlled. (Do not include tillers in count).
- No restrictions on crop stage.

7. HOW TO APPLY:

With: Aircraft or ground equipment
Rate: To Barley: 4.2 L/ha when there are 201 or more wild oats/m²
3.5 L/ha when there are 1-200 wild oats/m²
To Wheat: 4.2 L/ha when there are 201 or more wild oats/m²
3.5 L/ha when there are 1-200 wild oats/m²
(One 20 L container treats 5.7 ha at 3.5 L/ha rate.)
Water Volume: Aircraft: Minimum 20 L/ha
Ground - 100 L/ha
Spray Coupes - minimum 40 L/ha
Incorporation: Not applicable
Pressure: 300 kPa
Ground Speed: 9 km/h
Nozzles: All standard and low pressure nozzles delivering approximately 100 L/ha.
Protective Equipment: Wear goggles or face shield and rubber gloves when handling.

8. SPRAYING TIPS:

- 80° nozzles more efficient than 65° nozzles
- Nozzles should be tilted 45° forward to enhance spray penetration
- Do not spray if rain is expected within 6 hours
- If foaming is a problem use a silicone-based anti-foam agent
- No restrictions on later applications of other pesticides
- Do not spray when crop is heavy with dew

9. HOW IT WORKS:

This chemical acts on growing point located at or just above soil surface. Placing herbicide at or below growing point is most efficient. It disrupts cell division and elongation causing growth to stop. Works best at high temperature and humidity.

10. EXPECTED RESULTS:

Wild Oats: Should start to yellow within 3-5 days after application. Speed will depend on temperature and humidity. Effect will be faster when temperature and humidity are high. Affected plants will turn brown or remain stunted and partially green throughout the season. Wild oats in the 1-2 leaf stage at spraying or those that emerge after spraying will be unaffected.

Crop: With rapid activity a slight yellowing of the crop may be visible in 5-7 days after application. It will not be visible 2 weeks after spraying.

Conditions under which poor results may be expected:

1. Spraying before 3 leaf stage
2. Too low a rate of Avege for the wild oat population
3. Inadequate coverage due to dense broad-leafed weed population.

11. EFFECTS OF RAINFALL: Rainfall within 6 hours will seriously decrease activity.

12. MOVEMENT IN SOIL: Not applicable.

13. GRAZING AND CROPPING RESTRICTIONS:

Drift: Danger from drift is low; only oats can be seriously affected by drift.

Grazing Restrictions: do not graze or feed crop for 8 weeks after treatment.

Crop Use After Hail: do not use for 10 weeks after treatment.

Succeeding Crops: No restrictions.

14. TOXICITY:

Fish & Wildlife : Rat LD₅₀ - 470 mg/kg

Bees: Non-toxic

15. SAFETY AND PRECAUTIONS: Harmful if swallowed, inhaled or absorbed through the skin. Causes eye irritation.

First Aid: If Swallowed: induce vomiting by sticking finger down throat or by giving soapy or strong salty water to drink. Repeat until vomit is clear. Call a physician. Never give anything by mouth to an unconscious person. In case of contact: Immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician. Wash clothing before reuse.

Toxicological Information (for physician): If swallowed, evacuate stomach immediately. Symptoms of poisoning — lethargy, diuresis, diarrhea, and prostration. Treat as for a quaternary ammonia compound.

16. STORAGE:

Store in heated area. Crystals will form if stored below 5°C and whole mixture will freeze if temperature drops lower. Crystals can be redissolved by allowing the pail to lie on its side in a warm place (or the crystal layer can be quickly redissolved in hot water). Activity is not affected if crystals are redissolved and thoroughly mixed.

17. WHERE AVAILABLE: Alberta Wheat Pool, Cargill Grain, Green Cross, Oliver Agricultural Supply, Federated Co-op, Pfizer Chemicals, UGG and UFA, Pioneer Grain.

Additional information available from:

Cyanamid Canada Inc.
Agricultural Products Department
2255 Sheppard Avenue East
Willowdale, Ontario
M2J 4Y5
Phone: (Edmonton) (403) 434-6324

BANVEL (dicamba)

1. **FORMULATIONS:** Solution, 400 g/L
Available in 10 litre containers
2. **REGISTERED MIXES:** Banvel + 2,4-D amine
Banvel + 2,4-D amine + mecoprop (Banvel 3, Kil-Mor)
Banvel + MCPA amine
Banvel + MCPA K (Dyvel)
Banvel + MCPA amine + mecoprop (Target)
Banvel + Sencor

Mixing with other pesticides: Not recommended.

3. **CROPS:** Spring, durum and winter wheat, oats, barley, field corn, pastures and rangeland grasses, noncrop areas, red fescue seed crops, and established turf.

Underseeding: Legume underseeding not recommended.

4. **WEEDS CONTROLLED:** Buckwheat (Tartary and wild), corn spurry, cow cockle, smartweeds (annual) - plus weeds controlled by other herbicides in the mix.
5. **WEEDS SUPPRESSED:** Canada thistle, cleavers, field bindweed, perennial sow-thistle.
6. **WHEN USED:** Crop Stage:

Wheat -	2-5 leaf stage - Banvel alone or tank mixes of Banvel + 2,4-D amine, Banvel + MCPA amine or Banvel + MCPA K (Dyvel). 2-4 leaf stage - Banvel + Sencor
Oats -	3-5 leaf stage - Banvel + 2,4-D amine + mecoprop (Banvel 3, Kil-Mor) 2-5 leaf stage - Banvel alone or tank mixes of Banvel + MCPA amine (or Banvel + MCPA K (Dyvel))
Barley -	3-4 leaf stage - Banvel + 2,4-D amine + mecoprop (Banvel 3, Kil-Mor) 2-3 leaf stage - Banvel alone or tank mixes of Banvel + 2,4-D amine, Banvel + MCPA amine or Banvel + 2,4-D amine + mecoprop (Banvel 3, Kil-Mor.)
Corn -	2-3 leaf stage - Banvel + MCPA K (Dyvel) up to 15 cm leaf extended - Banvel alone or tank mix of Banvel + 2,4-D amine.
Pasture and Rangeland Grasses -	15-75 cm with drop nozzles (pipes) - Banvel alone or tank mix of Banvel + 2,4-D amine.
Crop-Free Land -	When weeds are actively growing - Banvel alone, Banvel + 2,4-D amine, Banvel + 2,4-D L.V. ester. (Do not use on timothy grown for seed).
Red Fescue -	On summerfallow - cultivate in the spring and apply when thistles are in the bud stage and field bindweed is in the flowering stage. Cultivate three weeks after treatment - Banvel alone. On stubble - Apply to regrowth after harvest and at least two weeks before killing frost - Banvel alone.
Established Turf -	When new seedling stands are 5.0 cm tall Banvel alone, Banvel + 2,4-D amine, Banvel + MCPA amine. In established stands up to the shot blade stage - Banvel alone, Banvel + 2,4-D amine, Banvel + MCPA amine.
	Apply when weeds are actively growing - Banvel alone, Banvel + 2,4-D amine.

7. **HOW TO APPLY:**

With:	Ground equipment.
Rate:	Wheat: 0.275 - 0.35 L Banvel per hectare when using Banvel alone, Banvel + 2,4-D amine, Banvel + MCPA amine, Banvel + MCPA K (Dyvel). 0.275 L Banvel per hectare when using Banvel + Sencor. Oats - 0.275 L Banvel per hectare when using Banvel alone, Banvel + MCPA amine, Banvel + MCPA K (Dyvel). Barley - 0.275 L Banvel per hectare when using Banvel alone, Banvel + MCPA amine, Banvel + MCPA K (Dyvel), Banvel + Sencor. Corn - 0.70 L Banvel per hectare when using Banvel alone, 0.35 L Banvel per hectare when using Banvel + 2,4-D amine. Pasture and Rangeland grasses - 1.50 - 11.0 L Banvel per hectare when using Banvel alone, 1.50 - 2.75 L Banvel per hectare when using Banvel + 2,4-D amine, Banvel + 2,4-D L.V. ester. Brush Control - 1.5 L Banvel per 1,000 L of water when using Banvel + 2,4-D amine, Banvel + 2,4-D L.V. ester. Crop-Free Land - 3.0 L Banvel per hectare when using Banvel alone. Red Fescue - 0.70 L Banvel per hectare when using Banvel alone, Banvel + 2,4-D amine, Banvel + MCPA amine. Established Turf - 1.5 L Banvel per hectare when using Banvel alone, Banvel + 2,4-D amine. A 10 L jug of Banvel at the 0.275 L/ha rate treats 36 ha. A 10 L jug of Banvel at the 0.35 L/ha rate treats 28 ha.

- Water Volume:** Wheat, oats, barley - 110 L per hectare
 Corn - 220-350 L per hectare
 Pastures and Rangeland grasses - 110-220 L per hectare
 Red Fescue - 110 L per hectare
 Established turf - 110 L per hectare
 Crop-Free Land - 110-220 L per hectare
- Incorporation:** Not applicable
- Pressure:** 275 kPa
- Ground Speed:** 9 km/h
- Nozzles:** All standard and low pressure nozzles delivering approximately 110 L, 220 L, 330 L per hectare.
- Protective Equipment** Standard equipment used when applying herbicides.

8. SPRAYING TIPS:

- 80° to 65° nozzles are more efficient than flood jet.
- Do not spray if rain is expected within four hours.
- Best application is when crop is under good growing conditions and air temperature 10 - 25°C.
- Avoid application if risk of severe drop in night temperature is forecast.
- Avoid application when crop is under stress.

9. HOW IT WORKS:

Banvel is a systemic herbicide that is absorbed either through the leaves or roots and translocated in the transport system by most plants. The exact mode of action is unknown, although it is suspected that there is disruption of normal metabolic and growth activities of the plant.

10. EXPECTED RESULTS:

Weeds: Banvel is a slow translocator and results may take 7-14 days to appear. Proliferation of tissues in plant cause -

- a) twisting, bending of main stem, leaf petioles
- b) cupping of leaves
- c) increase in root size
- d) stimulation of fibrous root production.

Crops:

1. Shortening of straw can occur in treated crops without having adverse affect on crop yield.
2. Head and stem deformities may occur if applied at the improper growth stage.

Conditions under which poor results may be expected:

1. Rain within four hours of application.
2. Crop injury may be expected if dicamba is applied when the crop is under stress from high temperatures (25°C +), low fertility, drought, disease, excess moisture, etcetera.
3. Injury may also occur if less than recommended water volume is used or if chemical is applied late.
4. Dicamba frequently injures crop to the extent that yields are lowered in weed free checks. Use only when weed competition is expected to be severe enough that controlling the weeds will offset possible damage.
5. Follow application instructions very carefully to avoid crop damage.

11. EFFECTS OF RAINFALL: Rainfall four hours after application will not reduce effectiveness.

12. MOVEMENT IN SOIL: Not applicable.

13. GRAZING AND CROPPING RESTRICTIONS:

Drift - Do not apply (except as recommended) on or near desirable trees or plants, or in locations where chemicals may be washed or moved into contact with their roots. Prevent drift of product to desirable plants.

Grazing Restrictions - The seed from treated grass should not be used for feed purposes.
 Do not slaughter meat animals fed with treated forage or grazed on treated areas within 28 days after the herbicide application.

GRAZING AND HAY MAKING RESTRICTIONS FOR DAIRY CATTLE

Per Hectare	Interval between treatment and grazing or cutting for hay for Dairy Cattle in days
Up to 1.5 L Banvel	7
1.5 L to 2.75 L Banvel	14
2.75 L to 5.50 L Banvel	30
5.50 L to 11.0 L Banvel	60

Succeeding Crops: No restrictions unless Banvel has been applied at 3.0 L rate/ha on crop free land. If applied at this rate, grow cereals, soybeans or field corn only the following year.

14. TOXICITY:

Rat acute oral (technical Banvel) - LD₅₀ - 1707-2900 mg/kg.
Rainbow trout - Median tolerated limit for 96 hr - 28,000 ppm

15. SAFETY AND PRECAUTIONS:

Banvel L.H. contact with skin, eyes, and clothing should be avoided. In case of contact, wash skin with soap and water, for eyes, flush with water for 15 minutes and get medical attention. Harmful if swallowed.

16. STORAGE: Protect from freezing but if frozen, no activity is lost if completely resuspended. Product stores indefinitely.

17. WHERE AVAILABLE: Alberta Wheat Pool, Cargill Grain, Pioneer Grain, United Grain Growers, Federated Co-op, Green Cross, Niagara Chemical, Oliver Industrial Supply, Pfizer Chemicals

Additional information available from:

Velsicol Corporation of Canada Limited
1360 Blundell Road
Mississauga, Ontario
L4Y 1M5
Phone: (416) 270-5112

BASAGRAN (bentazon)

1. **FORMULATIONS:** Basagran EC - 480 grams/litre
Available in 4 or 20 litre containers
2. **REGISTERED MIXES:** None
3. **CROPS:** Soybeans, lima beans, most dry and snap common beans, field and sweet corn, peas, fababeans, flax
4. **WEEDS CONTROLLED:** Black nightshade, bindweed (field), buttercup, cocklebur, common chickweed, common groundsel*, corn spurry, hairy galinsoga, lamb's-quarters*, mustard (wild), pigweed (redroot)*, purslane, ragweed (common and giant), smartweed, thistle (Canada and Russian), Venice mallow

* Triazine resistant species.

5. **WEEDS SUPPRESSED:** None
6. **WHEN USED:** Varies with weed species. Consult label for correct timing on weeds. Soybeans, most dry and snap common beans, and corn are tolerant at all growth stages.

Peas can be treated with Basagran only after 3 pairs of leaves (or 3 nodes) are present. Fababeans may be treated with Basagran when the crop has 2-4 leaves, or is at least 10 cm tall.

Flax may be treated with Basagran when it is 5 cm or taller.

7. **HOW TO APPLY:**

With: Ground equipment
Rate: All crops - 1.75-2.25 L/ha. The addition of Citowett Plus at 2.5 L/1000 L of spray is recommended when weeds are at the upper limit of their recommended stage. Addition of Citowett Plus not registered for flax and fababeans.
Water Volume: 200-400 L/ha
Incorporation: Not applicable
Pressure: 275-425 kPa
Ground Speed: 9 km/h
Nozzles: Do not use flood jet nozzles. Flat fan nozzles provide the best coverage.
Protective Equipment: Standard protective equipment used when applying herbicides.

8. **SPRAYING TIPS:** Basagran is most effective when weeds are young and growing actively and when temperatures are warm (greater than 21°C).
9. **HOW IT WORKS:** Basagran is a contact herbicide. It acts by interfering with photosynthetic processes. In resistant plants, it is metabolized to a non-toxic product.

10. **EXPECTED RESULTS:**

Weeds: Weeds turn yellow initially and then brown, usually within two weeks.

Crop: A slight leaf-yellowing, bronzing, speckling or burning may occur under certain conditions. The crop usually outgrows this condition within 10 days.

Conditions under which poor results may be expected:

1. Weeds beyond recommended growth stage.
2. Failure to penetrate crop or weed canopies resulting in poor coverage.
3. Poor growing conditions such as cool weather or drought.

11. **EFFECTS OF RAINFALL:** Rainfall within 6-8 hours of application may reduce activity.
12. **MOVEMENT IN SOIL:** Not applicable.
13. **GRAZING AND CROPPING RESTRICTIONS:**

Drift: Avoid drift on to susceptible crops such as rapeseed and mustard.

Grazing Restrictions: Do not feed green plants to livestock.

Succeeding Crops: No restrictions.

14. **TOXICITY:** Fish and Wildlife: Rat LD₅₀ - 850 mg/kg (technical)
Rainbow Trout LC₅₀ - 190 ppm
Bees - Relatively non-toxic

15. SAFETY AND PRECAUTIONS:

Symptoms of Poisoning in Humans: Not known.

First Aid: Treat symptomatically. In case of contact, flush eyes with plenty of water for 15 minutes and get medical attention.

16. STORAGE: Basagran should be stored in a heated place. However, freezing will not affect activity. If frozen, warm to room temperature and shake well.

17. AVAILABLE FROM: Oliver Industrial Supply

Additional information available from:

BASF Canada Inc.
10 Constellation Court
Rexdale, Ontario
M9W 1K1
Phone: (416) 675-3611

BASFAPON (dalapon)

1. FORMULATIONS: 74% soluble powder. Available in a 25 kg fiber drum.
2. REGISTERED MIXES: Basfapon may be mixed with 2,4-DB, monolinuron, linuron, diuron.

Mix Restrictions: Mix Basfapon with water first, then add the other weedkiller. Closely follow label directions of other weedkiller.

Mixing with Other Pesticides: Not recommended.

3. CROPS: Fallowland, potatoes, rapeseed, flax, asparagus, raspberries, peas, buckwheat.
4. WEEDS CONTROLLED: Annual grasses, barnyard grass, green foxtail, quackgrass
5. WEEDS SUPPRESSED: None
6. WHEN USED:

- a) Preplant or Summerfallow: In spring when grass is 10-15 cm high or in fall when grass is actively growing.
- b) Potatoes: In spring before plowing when grass is 10-15 cm high; after emergence of the grasses but before the emergence of the potatoes.
- c) Asparagus: after cutting
- d) Raspberries: In fall only
- e) Peas: When peas are 10-15 cm high and at least 25 days prior to harvest.
- f) Flax: When flax is 10-15 cm tall and when grasses are in 1-3 leaf stage.
- g) Rape, Rapeseed: When the crop plants are in the 2-4 leaf stage and grasses in the 1-3 leaf stage.
- h) Buckwheat: When buckwheat is in the 1-3 leaf stage.

7. HOW TO APPLY:

With:	Ground equipment
Rate:	Fallow or Preplant - 27.5-32.5 kg/ha Potatoes (Quackgrass control) - 17.5-22.5 kg/ha preplant Potatoes (seedling grasses) - 5.50-7.75 kg/ha Asparagus - 3.25-6.75 kg/ha Raspberries - 11 kg/ha Peas, Flax, Rape - 1.1-1.75 kg/ha Buckwheat - 0.55-0.85 kg/ha (at 1.1 kg/ha rate one 25 kg drum will treat 22.7 ha)
Water Volume:	100-400 L/ha
Incorporation:	Not applicable
Pressure:	275 kPa
Ground Speed:	9 km/h
Nozzles:	All standard and low pressure nozzles delivering 100 L/ha or more.
Protective Equipment:	Standard protective equipment used when applying herbicides.

8. SPRAYING TIPS: Grasses will be controlled better under good growing conditions.
9. HOW IT WORKS: Basfapon is absorbed by both roots and leaves, and is translocated to young growing tissue, where it interferes with metabolic processes.
10. EXPECTED RESULTS: Plants stop growing and eventually die. It may take up to three weeks for complete control to occur. Under poor growing conditions, such as drought or cold weather, results may be poor.
11. EFFECTS OF RAINFALL: Rainfall shortly after application may reduce control.
13. GRAZING AND CROPPING RESTRICTIONS:

Drift: Avoid drift onto susceptible crops.

Grazing Restrictions: To avoid the possibility of residues in meat or milk, do not graze or feed Basfapon treated grass or foliage to meat or dairy animals during the crop year of application.

Cropping Restrictions: Potatoes can be safely planted 4 days after treatment. Sensitive crops such as grass, small grains, corn or beans should not be planted for at least 30 days after treatment.
14. TOXICITY: Fish & Wildlife: Rats - 9300 mg/kg
Fish - low order of toxicity

15. SAFETY AND PRECAUTIONS:

Symptoms of poisoning in humans: Not known.

First Aid: Treat symptomatically. In case of contact, flush eyes with plenty of water for 15 minutes and get medical attention.

16. STORAGE: Store in a cool, dry place. Do not store below 0°C.

17. WHERE AVAILABLE: Alberta Wheat Pool, United Grain Growers

Additional information available from:

BASF Canada Inc.
10 Constellation Court
Rexdale, Ontario
M9W 1K1
Phone: (416) 675-3611

BENAZOLIN (benazolin)

1. FORMULATION: Water soluble solution 350 g/L. Available in 4 litre containers.
2. REGISTERED MIXES: None.
3. CROPS: Rapeseed

Underseeding: Not recommended.

4. WEEDS CONTROLLED: Wild mustard
5. WEEDS SUPPRESSED: Canada thistle
6. WHEN USED: When rapeseed plants have 2-3 leaves and mustard plant at 2-4 leaf stage.
7. HOW TO APPLY:

With: No equipment restrictions specified.
Rate: 1.5-2.1 L/ha (at 1.5 L/ha rate, one 4 L container will treat 2.7 ha)
Water Volume: 50-100 L/ha
Pressure: Sufficient to provide good coverage
Ground Speed: No restrictions specified
Nozzles: Those capable of providing 50-100 L/ha with complete coverage.
Protective

Equipment: Standard protective equipment used when applying herbicides.

8. SPRAYING TIPS: Remove all traces of 2,4-D or MCPA or other herbicide from sprayer before spraying rapeseed - this is **absolutely essential**. Good spray coverage is essential.
9. HOW IT WORKS: The primary mode of action has not yet been determined.
10. EXPECTED RESULTS: A kill or suppression of the wild mustard and thus a reduction in its competitive ability.
11. EFFECTS OF RAINFALL: No available information.
12. MOVEMENT IN SOIL: Not applicable.
13. GRAZING AND CROPPING RESTRICTIONS:

Drift: Avoid spray drift onto cereals, forage pasture and ornamental plants.

Grazing Restrictions: None specified

Use of crop after hail: No restrictions specified

Succeeding crop: No restrictions

14. TOXICITY: Rats - Acute Oral LD₅₀ > 3000 mg/ka
Harlequin fish: 24 hr. LC₅₀ - 108 ppm
15. SAFETY AND PRECAUTIONS: Effects of overexposure: skin and eye irritant.

Emergency and First Aid Procedures:

Eyes: Irrigate with water for at least 10 minutes

Skin: Remove contaminated clothing. Wash affected area with soap and water.

If irritancy persists obtain medical attention.

If swallowed: Wash out mouth thoroughly, give water to drink and obtain medical attention.

16. STORAGE: Heated storage is definitely required.
17. WHERE AVAILABLE: Green Cross Dealers

Additional Information Available from:

Green Cross Products
820 - 26th Street N.E.
Calgary, Alberta
T2A 2M4
Phone: (403) 273-5656

BLAGAL (cyanazine Plus MCPA-K)

1. **FORMULATIONS:** Suspension concentrate 125 g/L of cyanazine and 250 g/L of MCPA-K available in a carton containing two 10 litre containers.
2. **REGISTERED MIXES:** None registered nor recommended.
3. **CROPS:** All varieties of spring wheat, barley and oats (not undersown to forage crops), flax.

Underseeding: Not recommended.

4. **WEEDS CONTROLLED:** Buckwheat (tartary and wild), chickweed, corn spurry, hempnettle, lamb's-quarters, mustards (ball, tumble, wild, wormseed), pigweed (redroot), smartweeds (annual), stinkweed, plus other MCPA susceptible weeds.
5. **WEEDS SUPPRESSED:** Top growth control of Canada thistle and horsetail.
6. **WHEN USED:**

When cereals are in the 2-5 leaf stage, flax; when crop is 5-10 cm in height. Best weed control will be achieved when the weeds are small and actively growing, preferably before the 5 leaf stage. Weeds should be past the cotyledon stage (first two leaves to appear). For best results on Canada thistle, delay application until wheat, barley and oats have reached the 5 leaf stage.

7. **HOW TO APPLY:**

With: Ground equipment
Rate: 2.25 L/ha
One 10 litre container treats 4.4 ha.
Incorporation: Not applicable
Water Volume: Minimum 100 L/ha
Nozzles: 50 mesh or larger, flat fan nozzles (examples 6502, 8002)
Pressures: 275 kPa
Protective Equipment: Standard protective equipment used when applying herbicides.

8. **SPRAYING TIPS:**

Timing: Late application past the 5 leaf stage may cause serious crop injury and possibly poor weed control.
Sprayer: The sprayer must be equipped with a 50 mesh or larger screen filter and nozzle screens or plugging could be a problem (no felt filters). The pump must have sufficient capacity to supply the necessary pressure to the nozzles as well as allow for by-pass or jet-agitation mixing while spraying. Vigorous agitation may be necessary if the solution is allowed to stand in the sprayer tank several hours or longer.
Nozzles: 80° nozzles generally provide better weed control than 65° nozzles.
Speed: Preferably 8 km/h or less.
Boom angle: Direct the spray pattern straight downward to obtain maximum coverage.
Rainfall: Do not apply if rainfall is expected within 4 hours.
Other Pesticide Interval: 4 days should be allowed before or after a wild oat herbicide application.

9. **HOW IT WORKS:** Blagal is a post-emergent systemic herbicide which inhibits photosynthesis in the weed. Cyanazine and MCPA act synergistically to provide weed control. The MCPA contributes by breaking down the natural barriers of the plant cuticle, allowing the cyanazine more ready access to the photosynthetic mechanism of the weed. Death of the weed occurs due to the inhibition of the photosynthetic process. The first sign of activity will appear in 5-10 days.

10. **EXPECTED RESULTS:**

Weeds: 5-10 days after spraying, yellow blotches appear which spread until the plant turns yellow and brown and dies. Young, vigorous plants will be affected first.

Crop: If the crop is under stress (from lack of moisture or extreme temperature), Blagal may temporarily cause a yellowing of the lower leaves of the crop. However, the crop will recover quickly and any subsequent effect on crop growth and yield will be more than offset by the weed control obtained.

Conditions under which poor results may be expected:

1. Rain within 4 hours of application
2. Reduced application rate
3. Poor coverage due to wind, low water volume, or dense crop canopy
4. Extremely poor growing conditions
5. Late application

11. **EFFECT OF RAINFALL:** Rainfall within 4 hours will seriously decrease activity.

12. **MOVEMENT IN SOIL:** Not applicable.

13. GRAZING AND CROPPING RESTRICTIONS:

Drift: Danger is low, however, care must be used around shelterbelts and sensitive broad-leaved crops especially rapeseed.

Grazing Restrictions: Do not graze or feed green plants to livestock.

Use after hail: May be used if mature.

Succeeding crops: No restrictions.

14. TOXICITY:

Fish and Wildlife: Cyanazine - Acute oral LD₅₀ (rats) 334 mg/kg
MCPA - Acute oral LD₅₀ (rats) 700-800 mg/kg

Bees: Non toxic

15. SAFETY AND PRECAUTIONS: Harmful if swallowed and prolonged contact with skin should be avoided.

First Aid: If swallowed, induce vomiting immediately. This should be done by introducing a finger into the throat. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. Keep patient prone and quiet. Transport the patient immediately to the nearest physician.

Skin Contact: If spilled on the skin, remove all contaminated clothing at once. Thoroughly wash skin with soap and water. Contact physician. Wash contaminated clothing before reuse.

For eyes: If the material gets into the eyes, flush immediately with running water for at least 15 minutes. Contact physician.

16. STORAGE: Do not allow to freeze. Blagal may settle if stored below 0°C. It can be re-suspended if allowed to warm and then shaken. Activity is not affected if all the settled material is re-suspended.

17. WHERE AVAILABLE: Blagal is available in a carton containing two 10 litre jugs. Product is available from Shell Farm Supply dealers, Co-op Farm Supply Centre, Alberta Wheat Pool, United Grain Growers, Pioneer Grain and other independent agrochemical dealers.

Additional information available from:

Shell Canada Ltd.
Agrochemicals Development
Box 400, Terminal "A"
Toronto, Ontario
M5W 1E1
Phone: (Winnipeg) (204) 775-4997

BROMINAL-M (bromoxynil + MCPA)

1. FORMULATIONS: Emulsifiable concentration, 400 g/L (200 g/L bromoxynil + 200 g/L MCPA)
Available in 20 litre containers.

2. REGISTERED MIXES: Brominal-M + Avenge

Mix Restrictions: Fill the sprayer tank half full with clean water, then add the required amount of Brominal-M and mix thoroughly. Fill tank with water, add Avenge and mix again before spraying.

Mixing with other pesticides: Not recommended.

3. CROPS: Spring Wheat, barley, oats, flax and canary seed

Underseeding: Not recommended

4. WEEDS CONTROLLED: Bluebur, buckwheat (common, Tartary and wild), cow cockle, flixweed, lamb's-quarters, mustards (ball, tumbling, wild and wormseed), redroot pigweed, Russian thistle, scentless chamomile, shepherd's-purse, smartweeds (annual), stinkweed, volunteer rapeseed, volunteer sunflower.

5. WEEDS SUPPRESSED: Canada thistle, perennial sow-thistle

6. WHEN USED:

- Spray before weeds are past the 4 to 5 leaf stage.
- Wheat, Barley and Oats: 2-leaf to early flag-leaf stage.
- Flax: 5-10 cm high
- Canary Seed: 3 to 5 leaf stage

7. HOW TO APPLY:

With:	Aircraft or ground equipment
Rate:	1.4 L/ha (one 20 L container treats 14.3 ha)
Water Volume:	- aircraft - 20 or more L/ha, 40 to 50 L/ha preferred - ground - 50 L or more/ha
Incorporation:	Not applicable
Pressure:	275 kPa
Ground Speed:	9 km/h
Nozzles:	Flood jet nozzles are not recommended
Protective Equipment:	Standard protective equipment used when applying herbicides.

8. SPRAYING TIPS:

- Avoid spraying during a severe drought. Under conditions of high temperature and humidity, slight discolouration of cereals may occur. However, this has not resulted in permanent injury and has not reduced crop yields.
- Flax is less tolerant to Brominal-M than cereals, therefore avoid spraying flax under hot, humid weather and daytime temperatures over 29°C.
- Adequate spray coverage is important.

9. HOW IT WORKS: Bromoxynil is absorbed by the foliage but not translocated once absorbed. It inhibits plant photosynthesis and respiration. MCPA is absorbed through leaves and readily translocated in the plant. It has systemic action.

10. EXPECTED RESULTS:

Broadleaf Weeds: Affected plants will turn brown within 3-5 days of application.

Flax: Flax is less tolerant of this product than are cereal crops. Some leaf-burn and retarded growth may delay maturity 2 to 3 days.

Conditions under which poor results may be expected:

1. Late spraying: majority of the weeds past the 5 to 6 leaf stage
2. Inadequate spray coverage
3. Too low a spray pressure

11. EFFECTS OF RAINFALL: Rainfall within 2 hours may decrease effectiveness.

12. MOVEMENT IN SOIL: Not applicable.

13. GRAZING AND CROPPING RESTRICTIONS:

Drift: Avoid spray drift

Grazing Restrictions: No restrictions

Crop use after Hail: No restrictions

14. TOXICITY:

Fish and Wildlife: Toxic to fish, so do not contaminate water.

Rat LD₅₀ 245 mg/kg

15. SAFETY AND PRECAUTIONS: Harmful if swallowed. Avoid contact with skin, eyes and clothing. Do not inhale fumes and avoid breathing spray mist.

First Aid: Bromoxynil: No systemic toxicity noted. If on skin wash thoroughly with soap and water. For eyes wash with clean water or suitable eye wash for 10 - 15 min.

MCPA: If inhaled remove to fresh air. Moderately strong eye irritant — wash with water and seek medical help. If ingested - get medical attention - **do not** induce vomiting unless a large amount swallowed. If patient is unconscious give artificial respiration. Obtain medical attention immediately.

16. STORAGE: Store in heated area. Do not freeze. Brominal-M may crystallize if frozen. If crystallization has taken place, warm the drum in a warm room or sun, with frequent agitation, until crystals are dissolved.

17. WHERE AVAILABLE: United Grain Growers, United Farmers of Alberta, Niagara Dealers,

Additional information available from:

Allied Chemical Services Ltd.

5507 - 1 Street S.E.

Calgary, Alberta

T2H 1H9

Phone: (403) 253-8471

BUCTRIL M (bromoxynil + MCPA)

1. FORMULATIONS: 450 g/L (225 g/L bromoxynil, 225 g/L MCPA)
Available in 20 litre containers

2. REGISTERED MIXES: Buctril M + Asulox F
Buctril M + MCPA
Buctril M + Avenge

Mix Restrictions: Add Buctril M to Asulox F already mixed in the spray tank.

3. CROPS: Spring wheat (including durum), barley, oats, flax, canary seed

Underseeding: Not recommended.

4. WEEDS CONTROLLED: Bluebur, buckwheat (common, Tartary and wild), Canada thistle, common groundsel, cow cockle, flixweed, hemp-nettle*, lamb's-quarters, mustards (ball and wild), perennial sow-thistle, ragweed, redroot pigweed, Russian thistle, scentless chamomile, shepherd's-purse, smartweeds (annual), stinkweed, volunteer rapeseed, volunteer sunflower.

* MCPA tank mix

5. WEEDS SUPPRESSED: Not applicable.

6. WHEN USED: Cereals - 2 leaf to early flag leaf stage when weeds are in seedling stage.
Flax - 5-10 cm high
Canary Seed - 3 leaf to 5 leaf stage.

7. HOW TO APPLY:

With: Ground equipment
Rate: 1.25 L/ha (One 20 L container treats 16 ha at the 1.25 L/ha rate)
Water Volume: Not less than 50 L/ha
Incorporation: Not applicable
Pressure: 275 kPa
Ground Speed: 9 km/h
Nozzles: All standard nozzles delivering not less than 50 L/ha. Floodjet-type tips are not recommended.
Protective Equipment: Standard protective equipment used when applying herbicides.

8. SPRAYING TIPS: Spray when weeds are in the seedling stage.

9. HOW IT WORKS: Buctril M is a contact type herbicide, therefore, good spray coverage is essential.

10. EXPECTED RESULTS: Within a few hours or several days, depending on the weather, small areas of burnt tissue will appear on the leaves of the weeds. Complete death of the weeds will be evident in 1-2 weeks.

Conditions under which poor results may be expected:

1. Poor spray coverage.
2. Using less than the recommended rate of 1.25 L/ha.
3. Spraying flax when plants are unthrifty or under stress or in periods of hot, humid weather may cause crop damage.
4. Not spraying weeds when they are in the seedling stage.
5. Applying after the crop shields the weeds.

11. EFFECTS OF RAINFALL: No effect

12. MOVEMENT IN SOIL: Not applicable

13. GRAZING AND CROPPING RESTRICTIONS: No grazing or crop use restrictions.

14. TOXICITY:

Fish and Wildlife: Rat LD₅₀ - 365 mg/kg
Bees: Non Toxic

15. SAFETY AND PRECAUTIONS: Harmful if swallowed. Avoid contact with skin, eyes and clothing. Do not inhale fumes and avoid breathing spray mist.

First Aid: Bromoxynil: No systemic toxicity noted. If on skin wash thoroughly with soap and water. For eyes wash with clean water or suitable eye wash for 10 - 15 min. If inhaled remove to fresh air. If ingested - get medical attention immediately - **do not** induce vomiting. If patient is unconscious give artificial respiration. Obtain medical attention immediately.

16. STORAGE: Store in heated area. Bucril M may crystallize if frozen. If crystallization has taken place, warm the drum in a warm room or sun with frequent agitation until crystals are dissolved.

17. WHERE AVAILABLE: Alberta Pool, Oliver, Pioneer, Federated Cooperative, Cargill, Pfizer,

Additional information available from:

May & Baker Canada Inc.
1147 - 17 Avenue S.W.
Calgary, Alberta
T2T 0B7
Phone: (403) 245-3148

CALMIX (bromacil and 2,4-D)

1. FORMULATIONS: Pellets, Bromacil - 3.00% 2,4-D - 5.00%
Available in 1, 5 & 25 kilogram containers.

2. REGISTERED MIXES: Non registered

Mix Restrictions: Not applicable

Mixing with Other Pesticides: Not recommended

3. CROPS: Non-crop land only.

Underseeded: Not applicable

4. WEEDS CONTROLLED: Non-selective. Controls annual and perennial weeds. (see label for specifics)

5. WEEDS SUPPRESSED: Not applicable

6. WHEN USED: Calmix may be used during the growing season, but to prevent growth apply in early spring or fall.

7. HOW TO APPLY:

With: Calmix spreader or shaker.

Rate: (2.5 kg per 100 sq. m.) Annual weeds and perennial seedlings.

(3.75 kg per 100 sq. m.) Shallow-rooted perennials.

(5.0 kg per 100 sq. m.) Heavy perennial growth.

- Apply at the higher rate to heavier soils and/or to extend the growth control period.

- For spot treatment apply 375 grams to about 1 sq. metre. Repeat treatment when required.

- For treatment around power poles, treat 1.25 m around each pole (approximately 5.0 sq. metres).

Use about 250 g per pole.

Water Volume: Not applicable.

Incorporation: Not applicable.

Pressure: Not applicable.

Ground Speed: Not applicable.

Nozzles: Not applicable.

Protective

Equipment: Standard protective equipment used when applying herbicides.

8. SPRAYING TIPS:

- Do not use near lawns, flower beds or desirable trees and plants.
- Calmix should not be applied closer than 1½ times the height of nearby trees.

9. HOW IT WORKS:

Calmix Pellets are applied on the soil surface where a small amount of rainfall will activate the chemical and move it down into the root zone. As the chemical goes deeper, shallow-rooted weeds die and the deeper-rooted weeds show signs of chemical activity. This progresses until the entire weed population is dead. Once fixed in the soil Calmix does not move laterally.

10. EXPECTED RESULTS:

Vegetation present turns brown and dies. No new weed growth will appear, resulting in bare ground. Duration of control will depend upon amount of chemical applied, soil type and environmental conditions.

Conditions under which poor results may be expected:

1. Inadequate application rate

2. Soil erosion removes chemical from treated area when applied on slopes.

11. EFFECTS OF RAINFALL: Moisture will activate and carry the herbicide into the root zone.

12. MOVEMENT IN SOIL: Once fixed in the soil Calmix will not move laterally or leach down into the ground. Pellets can be carried by erosion.

13. GRAZING AND CROPPING RESTRICTIONS:

Drift: Not applicable

Grazing restrictions: Not applicable

Crop use after Hail: Not applicable

Succeeding Crops: Calmix is a total vegetation control chemical, for use only on non-cropland, where bare ground is desired.

14. TOXICITY: Fish and Wildlife: Bromacil and 2,4-D are slightly toxic to fish. Bromacil oral LD₅₀ rats: 5200 mg/kg 2,4-D oral LD₅₀ rats: 375 mg/kg
Bees: Not applicable
15. SAFETY AND PRECAUTIONS: Harmful if swallowed. May irritate eyes, nose, throat and skin. Avoid breathing dust.
- First Aid:** If on skin wash immediately with plenty of soap and water. If in eyes, flush with plenty of water for at least 15 minutes and get medical attention. In case of poisoning, call physician immediately. If swallowed, give the patient one to two glasses of water, and cause vomiting by giving one dose (15 ml) of syrup of ipecac. Repeat with water until vomit fluid is clear.
16. STORAGE: Store in dry area.
17. WHERE AVAILABLE: U.F.A., U.G.G., Shell Dealers, Niagara Dealers, Pioneer Grain, Cargill Grain, Federated Co-operatives

Additional information available from:

Allied Chemical Services Ltd.
5507 - 1st Street S.E.
Calgary, Alberta
T2H 1H9
Phone: (403) 253-8471

CARBYSNE 240 (barban)

1. FORMULATIONS: Emulsifiable concentrate 240 g/L
Available in 20 litre containers.

2. REGISTERED MIXES: No registered mixes.

Mixing with other pesticides: Not recommended.

3. CROPS: Spring wheat, Durum wheat, barley, rapeseed, mustard, flax, sunflower, peas (field and processing), fababeans, lentils, alfalfa, red clover, alsike clover, sweet clover, smooth brome grass, timothy*, Russian wild ryegrass, creeping red fescue*, and crested wheatgrass*.

* Seed stands only.

Underseeding: Carbyne can be used on the above crops underseeded to one or more of the above forage legume and grass species.

4. WEEDS CONTROLLED: Wild oats

5. WEEDS SUPPRESSED: None

6. WHEN USED: When the majority of wild oats are in the two leaf stage but before the crop reaches the following growth stages:

Wheat (spring, durum), barley, lentils	Before the fourth leaf appears or before the 14th day after emergence.
Flax	After the 2 (true) leaf stage but before the 12th leaf appears and before the 14th day after emergence.
Peas	Before the 6th leaf appears.
Forage legumes and grasses	Before the 4th leaf appears.
Rapeseed, mustard, sunflower, fababeans	May be sprayed at any time the wild oats are in the two leaf stage.

7. HOW TO APPLY:

With:	Aircraft or ground equipment
Rate:	To all crops apply 1.25-1.75 L/ha. On all crops, use the lower rate only under good growing conditions, when the wild oats have reached the two leaf stage in less than 10 days after emergence. Use the high rate on heavy infestations (50 or more wild oat plants per 1000 square centimetres) under poor growing conditions, or when wild oats have been injured by frost or wind. (At 1.25 L/ha rate, one 20L container treats 16 ha)
Water Volume:	Aircraft: Minimum 25 L/ha Ground Equipment: 45 L total spray volume/ha
Incorporation:	Not applicable
Pressure:	300 kPa (minimum)
Ground Speed:	6.5 km/h
Nozzles:	Tee Jet 650067, 730067, 800067 Monarch 20 and 22, Spray Jet 65.067 When wind velocity is 15-30 km/h use TK.75 or D.75 nozzles spaced at 100 cm on the boom.
Protective Equipment:	Standard protective equipment used when applying herbicides.

8. SPRAYING TIPS:

- Always make sure the sprayer is thoroughly cleaned before spraying Carbyne. This is especially important in preventing the carryover of MCPA or 2,4-D into rapeseed and mustard fields.
- Wild oat seedlings will produce a new leaf every five days (with good to average growing conditions). Therefore, they will reach the two leaf stage four to nine days after emergence.
- Carbyne contains an optimum blend of surfactants and wetting agents. Therefore, additional wetting agents and surfactants are not required in the spray tank.
- There are no restrictions on later application of other pesticides after the Carbyne treatment.
- Carbyne should not be applied when plants are wet with dew or rain. Dew or rain 15 minutes after spray operations will not affect the activity of Carbyne.
- To achieve good wild oat control with Carbyne, it is essential that the wild oat plants receive good coverage from the spray application. The required coverage can be obtained by:
- Applying Carbyne in sufficient water to give 45 L total spray volume/ha.
- Operating the sprayer at 300 kPa to ensure a good break-up of the spray into fine droplets.
- Rotating the spray booms to direct the spray down and forward at a 45 degree angle.

9. HOW IT WORKS:

Carbyne is a partially systemic herbicide (some translocation in plant), which penetrates the leaf and stem surfaces of the wild oat plant and interferes with cell division in the plant. Further development of the young seed head and new leaves is stopped shortly after the two leaf wild oat plant is treated. The first symptoms of Carbyne action are a stoppage of new growth, followed by a change in the color and texture of the plant. The plant becomes brittle, the leaf tips burn brown and the plant eventually dies.

10. EXPECTED RESULTS:

Wild Oats: An immediate stoppage of new growth, with the existing leaves gradually turning a blue-green color 7-10 days after application. At the same time a swelling of the stem at ground level may also be noted. The leaf tips will turn brown, the plant becomes brittle and eventually dies 3-4 weeks after treatment. The time required for these symptoms to appear and for the wild oat plant to die is affected by crop stand, growing conditions and soil fertility.

Crop: Carbyne treatment will not affect the crop if used as directed.

Conditions under which poor results may be expected:

1. Rain within 15 minutes of application.
2. Too low an application rate of Carbyne for existing conditions.
3. Inadequate spray coverage of the wild oat plant due to lower than recommended sprayer pressure, incorrect spray nozzles and improper sprayer calibration.
4. Improper timing of Carbyne application relative to the growth stage of the wild oat plants. Only the wild oat plants in the two leaf stage will be controlled.

11. EFFECTS OF RAINFALL: Rainfall within 15 minutes of application may decrease control.

12. MOVEMENT IN THE SOIL: Not applicable.

13. GRAZING AND CROPPING RESTRICTIONS:

Drift: The hazard from drift is low, only common oats, buckwheat and rye can be seriously affected by drift.

Grazing Restrictions: Do not graze or feed crop for 5 weeks after treatment.

Crop use after Hail: Do not use crop for 5 weeks after treatment.

Succeeding Crops: No restrictions.

14. TOXICITY:

Human: Carbyne is a skin irritant and sensitizer to some people.

Albino Rats:	Active Ingredient	Formulation
Acute Oral LD ₅₀	1350 mg/kg	2750 mg/kg
Acute Dermal LD ₅₀	2300 mg/kg	3360 mg/kg

Bees: Not available.

15. SAFETY AND PRECAUTIONS:

Carbyne is not a poisonous material. However, it can cause skin, eye and nose irritation. Avoid prolonged and direct contact of the chemical on the skin.

First Aid: If swallowed do not induce vomiting. Get medical attention immediately. In case of skin contact, wash immediately with soap and water. In case of eye contact, flush eyes with water for 15 minutes. Get medical attention.

16. STORAGE: At - 40°C Carbyne thickens but does not freeze. The viscosity will return to normal as the temperature is increased. The good cold weather properties allow Carbyne to be stored in unheated storage.

17. WHERE AVAILABLE: Alberta Wheat Pool, Cargill Grain, Federated Co-operatives, Green Cross Products, Niagara Chemicals, Oliver Industrial Supply, Pioneer Grain and United Grain Growers.

Additional information available from:

Velsicol Incorporated of Canada
1360 Blundell Road
Mississauga, Ontario
L4Y 1M5
Phone: (416) 270-5112

2,4-D

1. FORMULATIONS:

	grams active/litre
2,4-D ester	800
2,4-D low volatile ester	500,600,700
2,4-D amine	500

Available in 20 litre containers.

2. REGISTERED MIXES:

2,4-D + bromoxynil
2,4-D + dicamba
2,4-D + atrazine and related triazines
2,4-D + dalapon
2,4-D ester + difenzoquat (Avenge 200C)
2,4-D + sodium TCA (NaTA)
2,4-D + picloram (Tordon 202C)

3. CROPS: Wheat (spring and winter), barley, rye, oats, corn, flax (linseed), established seed grasses, grass pasture and turf, asparagus.

Note: See product label and chart in this write-up for restrictions on some crops and weeds controlled.

Underseeding: Not recommended.

4. WEEDS CONTROLLED:

Annual sunflower	Hard to Kill Weeds:
Bluebur	Bindweed (hedge)
Burdock	Dandelion
Cocklebur	Docks
Flixweed	Gumweed
Goat's-beard	Hairy galinsoga
Kochia	Mustard (dog)
Lamb's quarters	Oak-leaved goosefoot
Mustard (except dog and green tansy)	
Peppergrass (common)	Topgrowth control:
Pigweed (prostrate, Russian)	Bindweed (field)
Plantain	Blue lettuce
Prickly lettuce	Canada thistle
Purslane	Field horsetail
Ragweeds	Leafy spurge
Shepherd's purse	Pigweed (redroot)
Sow-thistle (annual)	Sow-thistle (perennial)
Stinkweed	
Sweet clover	
Vetch	
Wild radish	

5. WEEDS SUPPRESSED: Field peppergrass, biennial wormwood, pineapple weed, Russian thistle.

6. WHEN USED:

Wheat, Barley, Rye: From the 3 leaf expanded stage to just before the flag leaf (shot blade) stage.

Oats: From emergence to the 3 leaf stage or from the 6 leaf to just before the flag leaf. Oats are more sensitive to 2,4-D (especially the ester) than wheat or barley and generally the use of 2,4-D is not recommended on oats.

Flax (linseed-Amine only): Treat after the plants reach 5 cm in height and before the bud stage.

Corn (Amine only):

At emergence - between first emergence and when the corn plants are 15 cm tall.

Post-emergence - when plants are 15-20 cm tall and weeds have germinated but are still in the seedling stage. Use drop nozzles to keep spray off foliage of corn.

Grass pasture and turf: Apply to susceptible weeds when they are in the seedling stage.

Asparagus (Amine only): Treat following a cultivation just before first spears appear. Treatment may be repeated at end of cutting season.

7. HOW TO APPLY:

With: Aircraft or ground equipment
Rate: (All rates are in litres/hectare)
 Note: Higher rates indicated, may be used if crop is heavily infested with susceptible weeds, but some crop injury may occur).

FORMULATION AND CONCENTRATION

Crop	Amine 500	Ester 500	Ester 600	Ester 700	Ester 800
Wheat	0.70-1.1	0.70-1.75	0.60-1.5	0.47-1.25	0.40-1.14
Barley	1.25-1.8				
Rye	(see note above)				
Flax	0.70-1.1	_____	Not Recommended	_____	
Oats	0.70-1.1	_____	Not Recommended	_____	
Corn (at emergence)	1.5	_____	Not Recommended	_____	
post-emergence	0.55-1.1	_____	Not Recommended	_____	
Established alfalfa & grasses	1.1-2.0	1.5-1.75	0.85-1.5	Not Recommended	0.60-1.1
Grass pasture & turf	1.5-4.25	2.0-3.5	1.5-2.75	1.5-2.5	1.5-2.0
Asparagus	3.5	_____	Not Recommended	_____	

Water Volume: Aircraft: minimum 20 L water/ha
 Ground: Wheat, barley, rye, oats - 100 L water/ha
 Flax (linseed) - minimum 100 L water/ha
 Corn - 100 L water/ha
 Grass Pastures and Turf - Use enough water for thorough coverage (400 L water/ha)

Incorporation: Not applicable

Pressure: 275 kPa

Ground Speed: 9 km/h

Nozzles: Standard nozzles delivering a minimum of 100 L/ha

Protective

Equipment: Standard protective equipment used when applying herbicides.

8. **SPRAYING TIPS:** Apply in the amount of water required for even distribution. Spray during warm weather when the weeds are young and growing actively. At high temperatures vapourization of high volatile esters may cause injury to susceptible plants growing nearby.

9. **HOW IT WORKS:** Plant roots absorb salt forms of 2,4-D most readily. Leaves absorb ester more readily. 2,4-D translocates in the phloem moving with the food or in the transpiration stream. It is a hormone type herbicide causing an abnormal growth response, and affects respiration, food reserves and cell division.

10. **EXPECTED RESULTS:** Susceptible plants become malformed before they die.

11. **EFFECTS OF RAINFALL:** A rain free period of 4 to 6 hours is usually sufficient for effective weed control.

12. **MOVEMENT IN SOIL:** Under normal use conditions leaching does not pose a problem.

13. **GRAZING AND CROPPING RESTRICTIONS:** Do not use on turf of creeping grasses such as bent or on freshly seeded turf until grass is well established. Do not allow spray drift to contact vegetables, flowers, grapes, fruit trees, ornamentals or other desirable plants which are sensitive to 2,4-D.

Succeeding Crops: No restrictions.

14. **TOXICITY:**

Human: Some formulations may cause some skin irritation.

Inhalation toxicity is considered to be minimal.

Rats: LD₅₀ of various formulations range from 300 to 1000 mg/kg

Wildlife and Fish: Some formulations can be toxic to fish and should not be introduced into aquatic environments unless specifically recommended on the label.

15. **SAFETY AND PRECAUTIONS:** Causes eye and skin irritation. Avoid breathing spray mist. Effects of overexposure: Extreme cases - muscular weakness, vomiting, perspiring freely.

First Aid: Amines - Contact with eyes: flush with plenty of water for at least 15 minutes and get medical attention. Contact with skin: Wash with soap and plenty of water. If swallowed, induce vomiting. Get medical attention immediately. **Esters** - Contact with eyes: flush with plenty of water for 15 minutes and get medical attention. Contact with skin: wash with soap and plenty of water. If swallowed, do not induce vomiting. Get medical attention immediately.

16. STORAGE: If amines are exposed to temperatures below 0° they should be warmed to 4°C and mixed thoroughly before using. Store away from fertilizers, feeds, foodstuffs, seeds, insecticides or fungicides.
17. WHERE AVAILABLE: Oliver, Cargill, Pfizer, United Grain Growers, Alberta Wheat Pool, Federated Coop, UFA, Green Cross.

Additional information available from:

Uniroyal Chemical
4, 1323 - 44 Avenue N.E.
Calgary, Alberta
T2E 6L5
Phone: (403) 276-9481

Dow Chemical
Suite 2412, 10025 Jasper Ave
Edmonton, Alberta
T5V 1S6
Phone: (403) 428-0439

or manufacturer of brand purchased.

DESORMONE 7 (2,4-D AND DICHLORPROP)

1. FORMULATIONS: Emulsifiable concentrate: 2,4-D 350 g/L, dichlorprop 350 g/L
Available in 20 litre containers.
2. REGISTERED MIXES: Not recommended
Mixing Restrictions: Not applicable.
3. CROPS: Industrial areas, roadsides, utility right-of-ways.
Underseeding: Not applicable.
4. WEEDS CONTROLLED: Alder, aspen, birch, buckbrush, elderberry, hazel, honeysuckle, poplar, sumac, wild cherry, willow
5. WEEDS SUPPRESSED: None.
6. WHEN USED: Any time of the growing season.
7. WHEN TO APPLY:
 - With:** Power equipment, low volume knapsack sprayer, aircraft.
 - Rate:** 10 litres in 1000 litres of water for foliage stem method. See product label for alternate rates and methods.
 - Water Volume:** Use enough water or spray volume to ensure adequate coverage - With fixed-wing aircraft use 40 litres of spray solution per hectare.
 - Incorporation:** Not applicable.
 - Pressure:** Use pressure that is recommended for equipment used.
 - Ground Speed:** Not applicable.
 - Nozzles:** No restrictions.
 - Protective Equipment:** Standard protective equipment used when applying herbicides.
8. SPRAYING TIPS:
 - Add one half the required amount of water or oil to the spray tank, then add the herbicide with agitation, and finally, the balance of the water or oil with continued agitation.
 - If this material is to be used in straight oil mixture, do not let water get into the mixture.
 - This material forms an emulsion in water - not a solution. This tends to separate on standing. Provide agitation to prevent such separation and insure a uniform spray mixture.
9. HOW IT WORKS: Desormone is a translocated systemic post-emergence herbicide that is absorbed by the leaves of the plant. Investigation has shown that it causes abnormal growth response and affects respiration, food reserves and cell division.
10. EXPECTED RESULTS: Leaves will show wilting, and browning shortly after spraying. Leaves will not reappear the following year.
11. EFFECTS OF RAINFALL: Rainfall within 3 to 4 hours after application may reduce control.
12. MOVEMENT IN SOIL: Not applicable.
13. GRAZING AND CROPPING RESTRICTIONS:
 - Drift:** Drift onto nearby susceptible crops may cause injury.
 - Grazing Restrictions:** None Specified.
14. TOXICITY:
 - 2,4-DP (dichlorprop):** Fish and Wildlife Acute Oral LD₅₀ (rats) 800 mg/kg
 - 2,4-D:** Fish and Wildlife Acute Oral LD₅₀ (rats) 300-1000 mg/kg.
15. SAFETY AND PRECAUTIONS: Avoid contact with skin, eyes or clothing.
First Aid: If on skin, wash with plenty of soap and water. If in eyes, flush with plenty of water for at least 15 minutes and get medical attention. If swallowed, **do not** induce vomiting but rush patient to nearest hospital or doctor's office taking labelled container with you. If patient is unconscious give artificial respiration.
16. STORAGE: Do not store near fertilizers, seeds, insecticides or fungicides. If product was stored under freezing conditions warm to 5°C and mix well before using.
17. WHERE AVAILABLE: Allied Chemical Services Ltd.
Additional Information Available from:
 - Allied Chemical Services Ltd.
 - 5507 - 1st Street S.E.
 - Calgary, Alberta
 - T2H 1H9
 - Phone: (403) 253-8471

DOWPON M GRASS KILLER (dalapon)

1. FORMULATIONS: Free flowing wettable powder.
Dalapon . . . 74% active.
Available in 25 kg bags.
2. REGISTERED MIXES: Dowpon M and 2,4-D
Dowpon M and MCPA Amine

Mixing Restrictions: Have spray tank at least half full of water. Add Dowpon M slowly, stirring to dissolve it completely. Then add the broadleaf weed killers.

Mixing with other Pesticides: Not recommended.

3. CROPS: Fallowland, flax, rapeseed, birds-foot trefoil, alfalfa, new legume spring seedlings, peas (field and processing).
4. WEEDS CONTROLLED: Barnyard grass, blue grass, green foxtail (seedling), quackgrass, reeds, cattails.
5. WEEDS SUPPRESSED: None
6. WHEN USED:

Preplant Treatments:

1. Pasture renovation - for late fall application follow Dowpon M with cultivation and seed the following spring. After summer application cultivate 4 to 10 days after treatment and wait two weeks before seeding legumes.
2. Fall treatment for quackgrass on land to be planted to alfalfa, the following spring. Plough or cultivate 4 to 10 days after treatment.
3. Spring treatment for quackgrass control: land to be cropped in the year of treatment. Wait 4 or 5 weeks before seeding crops such as alfalfa. Wait 4 to 10 days and plough down or cultivate.
4. Spring treatment on fallow land - apply when quackgrass is growing actively. Plough or cultivate in 4 to 10 days. Retreat regrowth.

Grass Control in Crops:

1. Flax and rape - apply when crops are from the seedling to 15 cm tall and grass is from the seedling to 3 leaf stage.
2. Bird's foot trefoil and alfalfa (seed only) - apply in the fall when regrowth following cutting is 15 cm tall. Spring treatment should be made before active growth begins.
3. New legume spring seedlings - apply 4 weeks after seeding (bird's foot trefoil or alfalfa) when grass seedlings are small and legumes are 5-8 cm tall (3-4 leaf stage).
4. Peas - apply 25 days prior to harvest when grass seedlings are young and peas are 5-15 cm tall.

7. HOW TO APPLY:

With: Aircraft (pre-plant and non-cropland treatments only) or ground equipment.

Rate: Pre-Plant Treatments:

1. Pasture renovation: Use 5.5 kg Dowpon M/ha.
2. Fall treatment for quackgrass control: Use 17 kg of Dowpon M/ha.
3. Spring treatment for quackgrass control: Land to be cropped in the year of treatment: use 9 kg Dowpon M/ha.
4. Spring treatment on fallowland: Use 11 kg of Dowpon M/ha. (At 17 kg/ha rate, one bag will do 1.5 ha).

Grass Control in Crops:

1. Flax and rapeseed: Use 1.1-1.7 kg of Dowpon M/ha.
2. Bird's foot trefoil and alfalfa (for seed only): In established stands of bird's foot trefoil use 3.4 kg Dowpon M/ha. In established stands of alfalfa use 5.5 kg of Dowpon M/ha.
3. New legume spring seedlings: Use 2.2-3.4 kg of Dowpon M/ha.
4. Peas: Use 1.1 kg of Dowpon M/ha. (At 1.1 kg/ha rate, one bag will do 22.7 ha).

Water Volume: Aircraft: Use minimum 40 L of water/ha Ground: Use a minimum of 100 L of water/ha

Incorporation: Not applicable.

Pressure: 275 kPa

Ground Speed: 9 km/h

Nozzles: All standard and low pressure nozzles, delivering 100 L/ha or more.

Protective

Equipment: Standard protective equipment used when applying herbicides.

8. SPRAYING TIPS: In tank mixes with broadleaf herbicides do not use more than 9 kg of Dowpon M/ha. Do not apply in the same summer and fall. Spray thoroughly and uniformly.
9. HOW IT WORKS: Absorbed by both roots and leaves and is easily washed off foliage. Translocates readily throughout the plant and accumulates in young tissue. It affects cell membrane permeability.
10. EXPECTED RESULTS: Several weeks may be required for maximum effect on top growth in heavy stands. Because of limited persistence in the soil, new seedling grasses may invade treated area. Re-treat or cultivate. If grass is not growing well ie. overly mature or suffering from drought or cold weather, results may be poor.

11. **EFFECTS OF RAINFALL:** Under dry conditions decomposition may be slower, and more time will be required after ploughing before certain crops can be planted. Rain shortly after application can wash the herbicide off the leaves.
12. **MOVEMENT IN SOIL:** Not a problem under normal use conditions.
13. **GRAZING AND CROPPING RESTRICTIONS:** Do not allow dairy or meat animals to graze on treated vegetation during the year of application. Do not graze or feed cuttings of bird's-foot trefoil or alfalfa, the year of treatment, to dairy animals or animals being finished for slaughter. Do not feed treated pea vines, pea silage or pea vine hay to livestock. On land to be planted to sensitive crops, including grasses, delay planting for at least 30 days after ploughing or deep cultivation, following application.
14. **TOXICITY:**
- Human: **Skin:** moderate irritation on repeated prolonged contact.
Inhalation: dust may be irritating to the upper respiratory tract.
- Rats: LD₅₀ is 9330 mg/kg
Fish: Low order of toxicity.
15. **SAFETY AND PRECAUTIONS:** Causes eye irritation, may cause skin irritation. Avoid contact with eyes, skin or clothing. Avoid breathing spray mist.
First Aid: In case of contact, flush eyes with plenty of water for at least 15 minutes, get medical attention. For skin, remove contaminated clothing and wash skin with plenty of water. Wash clothing before re-use.
16. **STORAGE:** Store away from food and feedstuffs.
17. **WHERE AVAILABLE:** Oliver, Cargill Grain, Federated Co-operatives.

Additional information available from:

Dow Chemical of Canada Limited
Suite 2412, 10025 Jasper Avenue
Edmonton, Alberta
T5J 1S6
Phone: (403) 428-0439

DUAL — CIBA-GEIGY (metolachlor)

1. **FORMULATIONS:** Emulsifiable concentrate containing 960 g/L metolachlor.
Available in 20 litre pails.
2. **REGISTERED MIXES:** Dual - Ciba-Geigy may be applied as a split application or tank mix partner with the following herbicides: Note: See product label for additional information regarding mixture rates, application, procedures and timing and other restrictions.

CORN (seed, grain, silage, sweet)	POTATOES
Aatrex liquid	Maloran 50*
Aatrex Nine-O	Pataron 50W
Aatrex 90 WP	Patoran 670 Flowable
Atrazine 80W	Sencor 500 Flowable
Bladex 80W	
Bladex 4.8L	
Kil-Mor	
Estemine 2,4-D	
Banvel	

* Do not use on potato variety "Superior"

LIQUID NITROGEN: 28% Nitrogen solutions or complete liquid fertilizers may replace all or part of the water as a carrier for pre-plant incorporated or pre-emergent application of Dual - Ciba-Geigy tank mixes in corn.

3. **CROPS:** Corn, potatoes and common (white) beans
4. **WEEDS CONTROLLED:** Barnyard grass, foxtail (green and yellow). Plus annual broadleaf weeds listed for other herbicide in mix or oversprayed.
5. **WEEDS SUPPRESSED:** None
6. **WHEN USED:** Pre-plant incorporated.
7. **HOW TO APPLY:**

With: Ground equipment
Rate:

POTATOES, WHITE BEANS - 2-2.75 L/ha
CORN - TANK MIXTURES

Weeds Controlled	DUAL - CIBA-GEIGY Timing	Rate/hectare	Rate per hectare + Tank mix
Annual grasses and Broadleaf weeds	ppi*	2 - 2.75 L	+ 1.25-1.75 kg Aatrex Nine-O or 1.25-1.75 kg Aatrex 90W or 2.25-3.25 L Aatrex Liquid or 2.25-3.25 kg Bladex 80W or 3.75-5.5 L Bladex 4.8 L or 1.5 - 2.0 kg Atrazine 80W
Weeds Controlled	DUAL - CIBA-GEIGY Timing	Rate/hectare	Rate per hectare + split applied product (post-emergence)
Annual grasses and Broadleaf weeds	ppi & post**	2 - 2.75 L	+ 850 ml-1.1 L KIL-MOR or 700 ml-1.1 L Estemine 2, 4-D

* pre-plant incorporated, ** post-emergence
(At 2 L/ha rate of Dual, one 20 L container will treat 10 ha)

Water Volume: 50-100 L/ha

Incorporation: Incorporate to a depth of 5 cm. Do not exceed this depth of incorporation since dilution of the product can occur. If using tandem discs set to cut to a depth of 10 cm operated at 6 to 9 kilometres per hour. If using "S tine" (Danish) cultivators with tines on 15-20 cm centres, set 10 cm deep and operate at 9-13 kilometres per hour. Spike tooth or diamond tooth harrows are not considered preferred incorporation equipment and if used, incorporation must be done in two directions at right angles to each other. Immediate incorporation is not necessary although desirable.

Pressure: 275 kPa

Ground Speed: 9 km/h

Nozzles: All standard and low pressure nozzles delivering approximately 50-100 L/ha.

Protective

Equipment: Standard protective equipment used when applying herbicides.

8. **SPRAYING TIPS:** Avoid drift onto nearby crops, gardens, etc. Do not tank mix with KIL-MOR or Estemine.
9. **HOW IT WORKS:** Metolachlor is a germination inhibitor, active mainly on grasses.
10. **EXPECTED RESULTS:** High percentage of control on annual grasses expressed by lack of germination or die back soon after the seedling emerges. This "post-kill" situation is more common under fairly dry conditions and can be variable since metolachlor requires moisture to perform at its best.
11. **EFFECTS OF RAINFALL:** If rainfall is excessive, the product may be moved below the layer of germinating grasses.
12. **MOVEMENT IN SOIL:** Some movement is possible if sufficient moisture is present. Leaching can occur in sandy soils.
13. **CROPPING AND GRAZING RESTRICTIONS:**
- Do not use Dual - Ciba-Geigy on muck, peat or high organic soils.
Do not apply Dual - Ciba-Geigy once crop emergence has begun.
Winter cereals may be planted 4½ months following application of Dual - Ciba-Geigy.
14. **TOXICITY:** Metolachlor is practically non-toxic to birds but has slight to medium toxicity to fish. The oral and dermal LD₅₀ of the technical material is 2780 and is greater than 3170 mg/kg (Rats). The LC₅₀ (Rats) is greater than 1750 mg/m³. The technical material has exhibited slight skin irritation and no eye irritation on rabbits.
15. **SAFETY AND PRECAUTIONS:**
- First Aid:** This product contains a petroleum distillate. If swallowed **do not** induce vomiting. Obtain prompt medical attention. If in eyes flush with large amounts of clean water for at least 15 minutes. Obtain medical attention. If on skin, wash with soap and water.
- Note:** Metolachlor may cause skin sensitization reactions in certain individuals.
16. **STORAGE:** No special temperature required.
17. **WHERE AVAILABLE:** All Green Cross Dealers

Additional information available from:

Green Cross Products
820 - 26 Street N.E.
Calgary, Alberta
T2A 2M4
Phone: (403) 273-5656

DYVEL (dicamba and MCPA K)

1. **FORMULATIONS:** Solution containing 84 g/L dicamba and 336 g/L MCPA potassium salt. Available in 10 litre containers.
2. **REGISTERED MIXES:** None specified.
3. **CROPS:** Barley, wheat and oats
4. **WEEDS CONTROLLED:** Buckwheat (wild), cocklebur, corn spurry, cow cockle, hemp-nettle, lamb's-quarters, mustard (Indian, wild, wormseed), pigweed (prostrate, redroot, Russian), ragweed (common, giant), Russian thistle, smartweeds (annual), stinkweed.
5. **WEEDS SUPPRESSED:** Canada thistle, sow-thistle
6. **WHEN USED:** 2-3 leaf stage of crop. Best results will be obtained on hemp-nettle, corn spurry and cow cockle if application is made at the 2 to 3 leaf stage of the crop when these weeds are young.
7. **HOW TO APPLY:**

With: Ground equipment
Rate: 1.25 L/ha (One 10 L container will treat 8 ha)
Water Volume: 110 L/ha
Incorporation: Not applicable
Pressure: 275 kPa
Ground Speed: 9 km/h
Nozzles: Standard nozzles delivering 110 L/ha
Protective Equipment: Standard protective equipment used when applying herbicides.

8. **SPRAYING TIPS:** Crops under stress from adverse environmental conditions such as excess moisture, drought, disease, etc., may suffer a setback when chemical is applied. However the crop injury that may occur is usually offset by the weed control obtained. Application should preferably be made early in the morning.
9. **HOW IT WORKS:** Dicamba - systemic herbicide absorbed through leaves or roots and translocated through plant. MCPA - systemic herbicide absorbed by leaves and stems and translocated through plant.
10. **EXPECTED RESULTS:** See inserts for dicamba and MCPA potassium salt.
11. **EFFECTS OF RAINFALL:** Not specified.
12. **MOVEMENT IN SOIL:** Not specified.
13. **GRAZING AND CROPPING RESTRICTIONS:** Do not graze or harvest livestock feed prior to crop maturity. See label or contact company for further information.
14. **TOXICITY:** Contact company for details.
15. **SAFETY AND PRECAUTIONS:** Harmful if swallowed. Avoid contact with skin, eyes and clothing.

First Aid: In case of contact with skin, wash with plenty of water; for eyes, flush with water for 15 minutes and get medical attention.

16. **STORAGE:** Protect from freezing.
17. **AVAILABLE FROM:**

Additional information available from:

Velsicol Incorporated of Canada
1360 Blundell Road
Mississauga, Ontario
L4Y 1M5
Phone: (416) 270-5112

EMBUTOX E (2,4-DB)

1. **FORMULATIONS:** Emulsifiable concentrate 400 g/L
Available in 4 and 20 litre containers.
2. **REGISTERED MIXES:** Embutox E + Asulox F (alfalfa only)
Mix Restrictions: Add Embutox E to the Asulox F already premixed in the spray tank.
3. **CROPS:** Seedling alfalfa, seedling birdsfoot trefoil, seedling white and alsike clover, spring wheat, barley, oats, field corn, pastures.
Underseeding: Can be used direct or underseeded.
4. **WEEDS CONTROLLED:** Bull thistle, Canada thistle, cocklebur, curled dock, field bindweed, lamb's-quarters, mustard (ball, wild and wormseed), narrow-leaved hawk's-beard, oak-leaved goosefoot, perennial sow-thistle, plantain, ragweed, redroot pigweed, shepherd's-purse, smartweeds (annual), stinkweed, wild buckwheat, yellow rocket.
5. **WEEDS SUPPRESSED:** Not applicable.
6. **WHEN USED:** Spray when weeds are in the 1-3 leaf (seedling) stage.

Seedling alfalfa and birdsfoot trefoil - 1-4 trifoliage leaf stage
Seedling white and alsike clover - after the first trifoliate leaf stage.
Cereals - after the crop has 5 fully expanded leaves but before the early flag leaf stage.
Field corn - after crop is 40 cm high but before the beginning of tasselling.
Pastures - after cutting or grazing, and before regrowth is 10 cm high.
7. **HOW TO APPLY:**

With:	Ground equipment
Rate:	2.75-4.25 L/ha (At 2.75 L/ha rate, one 20 L container will treat 7.3 ha)
Water Volume:	150-200 L/ha
Pressure:	275 kPa
Ground Speed:	9 km/h
Nozzles:	All standard nozzles delivering 150-200 L/ha
Protective Equipment:	Standard protective equipment used when applying herbicides.
8. **SPRAYING TIPS:**
 - Spray in warm weather when plants are growing well
 - Do not spray in drought conditions
 - Spray when weeds are at the susceptible stage
 - Damage (especially to established alfalfa) in pastures containing forage legumes may occur and is likely to increase in severity the longer treatment is delayed beyond stage recommended.
9. **HOW IT WORKS:** Some plants convert 2,4-DB to 2,4-D quite efficiently, while others (such a alfalfa) do not. This factor is the basis for selective use in certain legumes.
10. **EXPECTED RESULTS:**
Broadleaved weeds: Should be dead within 2-3 weeks of treatment.
Conditions under which poor results may be expected:
 1. Improper water volume
 2. Weeds too far advanced
 3. Very good growing conditions
11. **EFFECTS OF RAINFALL:** Rainfall before the foliage has dried from the spraying may decrease activity.
12. **MOVEMENT IN SOIL:** Not applicable.
13. **GRAZING AND CROPPING RESTRICTIONS:** Not applicable.
14. **TOXICITY:** Acute oral LD₅₀ (rats) - 1960 mg/kg
Bees: Non toxic
15. **SAFETY AND PRECAUTIONS:**
First Aid: In case of accidental skin or eye contact, the affected areas should be thoroughly washed with cold water, followed by a saline wash in the case of eye contact and washing with soap and water in the case of skin contact.
DANGER: This product contains an aromatic hydrocarbon solvent. In case of accidental swallowing **do not** induce vomiting. If patient is unconscious, give him air. Call a physician immediately.

16. STORAGE: No special precautions necessary.

17. WHERE AVAILABLE: Alberta Wheat Pool, Pioneer, Federated Cooperatives, Pfizer, Niagara, Cargill, Oliver, Green Cross, Chipman.

Additional information available from:

May & Baker Canada Inc.
1147 - 17 Avenue S.W.
Calgary, Alberta
T2T 0B7
Phone: (403) 245-3148

EPTAM (EPTC)

1. **FORMULATION:** Emulsifiable concentrate 800 g/L Available in 4 and 20 litre containers
Granular 10 G Available in 22.7 kg bags

2. **REGISTERED MIXES:** Eptam 8-E - liquid fertilizer

Mix Restrictions: Compatibility test

Mixing with other Pesticides: Not recommended

3. **CROPS:** Alfalfa and bird's-foot trefoil, beans (snap or dry), flax, Irish potatoes, sunflowers, turnips (rutabagas).

Underseeding: Not recommended.

4. **WEEDS CONTROLLED:**

Annual Grasses

Annual blue grass
Annual rye grass
Barnyard grass
Foxtails (Green, Yellow)
Volunteer grains
Wild oats

Perennial Weeds

Quackgrass

Annual Broadleaf Weeds

Common chickweed
Corn spurry
Deadnettle
Lamb's-quarters
Hairy nightshade
Pigweed (prostrate, redroot, tumble)
Purslane

NOTE: Refer to the label for special instructions for Perennial Weed Control

5. **WEEDS SUPPRESSED:** None

6. **WHEN USED:**

Alfalfa and Bird's-foot Trefoil (New Seedlings) - Just prior to planting. Eptam is not to be used if you are seeding a grain or grass nurse crop.

Beans, Snap or Dry - Just prior to planting - Do not use Eptam on Adzuki beans, cow peas, soybeans, lima beans or other flat podded beans except Romano.

Flax (Spring) - Apply just prior to planting.

Flax (Fall) - Apply just prior to freeze-up. The following spring just prior to seeding cultivate lightly to destroy any surviving winter germinating weeds.

Potatoes - Eptam can be incorporated in the fall or spring, after drag-off, or just prior to the last cultivation. Liquid Eptam can also be metered into irrigation equipment. Do not apply within 45 days or harvest.

Sunflowers - Apply and incorporate prior to planting.

Turnips - Apply and incorporate 6-10 days prior to planting.

7. **HOW TO APPLY:**

With:

Ground equipment or irrigation water

Rate:

Alfalfa and Bird's-foot Trefoil - 4.25 L/ha or 34 kg of Granular Eptam/hectare

Snap or Dry Beans - 4.25-5.5 L/ha or 34-45 kg of Granular Eptam/hectare

Flax - Spring Treatment

- Light soil 3.5 L/ha or 28 kg Granular Eptam/hectare

- Heavy soil 4.25 L/ha or 34 kg Granular Eptam/hectare

Flax - Fall Treatment

- Light Soil - 4.25 L/ha

- Heavy Soil - 5.5 L/ha

Potatoes

Before Planting - 4.25-8.5 L/ha or 34-67 kg Granular Eptam/hectare

Drag-Off 4.25-8.5 L/ha or 34-67 kg Granular Eptam/hectare

Post-Emergence 4.25-5.5 L/ha or 34-45 kg Granular Eptam/hectare

Sprinkler Irrigation - 4.25-5.5 L/ha

Fall Treatment - 5.5-8.5 L/ha

Sunflowers - Spring 4.25 L/ha or 34 kg Granular Eptam/hectare

Fall - 4.25-5.5 L/ha EC

Turnips - Sandy soil - 3.25 L/ha or 22.5 kg Granular Eptam/hectare

- Heavy soil - 4.25 L/ha or 34 kg Granular Eptam/hectare

Water Volume: 100 L/ha

Incorporation: Following application of Eptam 8-E or 10G, the product should be incorporated immediately (within minutes) into the soil. The incorporation can be made with several types of implements. If using power-driven cultivation equipment, set the implement to cut 5-7.5 cm deep.

Tandem and One Way Discs should be set to cut 10-15 cm and should be operated at 6.5-9.5 km/h followed by harrows. Incorporation should be done twice in two different directions.

Field Cultivators - Recommended only for lighter soils in good tilth. Use 3-4 rows of sweeps spaced no wider than 18 cm. Sweeps should be at least 18 cm wide. Cut 10-15 cm deep at 9.5 km/h. The second incorporation must be made at an angle to the first. Harrows should be pulled behind the cultivator.

Pressure: Adequate to give the required spray pattern.

Ground Speed: 9 km/h

Nozzles: All standard and low pressure nozzles delivering approximately 100 L/ha

Protective

Equipment: Standard protective equipment used when applying herbicides.

8. **SPRAYING TIPS:** When you are applying Eptam 8-E, use 100 L high volume low-pressure nozzles, which helps to eliminate spray drift and maximize soil coverage.

9. **HOW IT WORKS:** Eptam is taken up by the roots and shoots of a germinating weed. The Eptam taken into the weed disrupts and stops further growth. Eptam is not persistent in the soil, however it will give effective weed control for approximately 6-8 weeks.

10. **EXPECTED RESULTS:**

Weeds: Eptam controls a wide variety of weeds at the time when weed control is essential. Eptam controls the weeds before they can compete for moisture and nutrients needed by the crop.

Since Eptam is absorbed by the weed shoot, most effected weeds will not emerge. Numerous chlorotic and bleached shoots may be visible by removing the top few inches of treated soil.

Crop: Applied according to directions and under normal growing conditions, Eptam 8-E will not harm the treated crop. However, during germination and early stages of growth, unusually cold and wet, or hot and dry weather, insect, nematode, or plant disease attack, the use of certain soil-applied systemic insecticides, highly saline or alkaline soil conditions, improperly placed fertilizers or soil insecticides may create abnormal conditions that weaken crop seedlings. Eptam 8-E used under these conditions could result in crop injury.

Conditions under which poor results may be expected:

1. Conditions not suitable for application and incorporation (i.e wet, cloddy soils).

11. **EFFECTS OF RAINFALL:** Eptam is very soluble in water and excessive moisture may leach Eptam from the surface.

12. **MOVEMENT IN SOIL:** Eptam will move readily in the soil.

13. **GRAZING AND CROPPING RESTRICTIONS:**

Drift: Danger from drift is low

Grazing Restrictions: None

Crop use after Hail: No restrictions

Succeeding Crops: No restrictions

14. **TOXICITY:**

Fish and Wildlife: Oral LD₅₀ Rats - 1652 mg/kg

Bees: Not applicable

15. **SAFETY AND PRECAUTIONS:** Harmful if swallowed. Avoid contact with skin, eyes and clothing. Avoid breathing dust.

First Aid: Ingestion may produce symptoms. Absorption through skin or inhalation of quantities sufficient to produce poisoning is unlikely.

1. Induce vomiting by giving warm, salty water or large amounts of tap water.

2. Call a physician.

For Physician:

1. Induce vomiting or lavage stomach.

2. Give symptomatic and supportive treatment.

16. **STORAGE:** Eptam is not affected by freezing temperatures and thus does not require heated storage. Eptam should be stored away from all seed and fertilizer.

17. **WHERE AVAILABLE:** Eptam 8-E and 10G can be purchased from almost all of the grain companies and from many independent farm supply dealers.

Additional information available from:

Chipman Inc.

P.O. Box 965

Winnipeg, Manitoba

R3C 2V5

Phone: (204) 786-3421

ERADICANE 8-E (EPTC + R25788)

1. FORMULATIONS: Emulsifiable concentrate, 800 g/L
Available in 22.7 litre containers

2. REGISTERED MIXES: Eradicane - liquid fertilizer

Mix Restrictions: Compatibility test

Mix with other pesticides: Not recommended

3. CROPS: Corn

Underseeding: Not recommended

4. WEEDS CONTROLLED:

Annual Grasses

Annual blue grass
Annual rye grass
Barnyard grass
Fall panicum
Green & Yellow foxtail
Volunteer grain
Wild oats

Perennial Weeds

Quackgrass

Annual Broadleaf Weeds

Common chickweed
Corn spurry
Henbit
Lamb's-quarters
Hairy nightshade
Pigweed (prostrate, redroot, tumble)
Purslane

NOTE: Refer to the label for special instructions for Perennial Weed Control

5. WEEDS SUPPRESSED: None

6. WHEN USED: Apply and incorporate Eradicane 8-E prior to planting the corn crop. Seeding should be done as soon as possible to obtain a maximum period of weed control.

7. HOW TO APPLY:

With: Ground equipment only

Rate: 4.25-8.25 L/ha (One 20 L container will treat 4.7 ha at 4.25 L/ha rate)

Water Volume: Ground - 100 L/ha

Incorporation: Immediately (within minutes) following application, should be made using power-driven cultivation equipment set to cut 5-7.5 cm deep, or tandem discs or one-way discs set 10-15 cm deep, or a Danish-type cultivator with tines set 15-20 cm apart at a depth of 10 cm and operated at a speed of 6.5-9.5 km/h for power-driven cultivation equipment and discs and at least 9.5-13 km/h for cultivators. This is to ensure adequate mixing of the soil. A second working should be made at right angles to the first operation for further mixing of the soil.

Pressure: Adequate to give proper spray pattern.

Ground Speed: 9 km/h

Nozzles: All standard and low pressure nozzles delivering approximately 100 L/ha

Protective

Equipment: Standard protective equipment used when applying herbicides.

8. SPRAYING TIPS: When applying Eradicane 8-E use a 100 L/ha high-volume low pressure nozzle, which helps to eliminate spray drift and maximize soil coverage.

9. HOW IT WORKS: Eradicane is taken up from the soil by the roots and shoot of a germinating weed. It disrupts and stops further growth of the weed, which results in the death of the weed.

10. EXPECTED RESULTS:

Weeds: Eradicane 8-E controls a wide variety of annual weeds in corn crops when weed control is essential. Eradicane controls the weeds before they can compete for moisture and nutrients needed by the crop. Since Eradicane is absorbed by the weed shoot, most affected weeds will not emerge. Numerous chlorotic and bleached shoots may be visible by removing the top few inches of treated soil.

Crop: Applied according to directions and under normal growing conditions, Eradicane 8-E will not harm the treated crop. However, during germination and early stages of growth, unusually cold and wet or hot and dry weather, insect, nematode, or plant disease attack, the use of certain soil-applied systemic insecticides, highly saline or alkaline soil conditions, improperly placed fertilizers or soil insecticides may create abnormal conditions that weaken crop seedlings. Eradicane 8-E used under these abnormal conditions could result in crop injury.

Conditions under which poor results may be expected:

1. Conditions not suitable for application and incorporation (i.e. wet, cloddy soils).

11. EFFECTS OF RAINFALL: Eradicane is very soluble in water and excessive moisture may leach Eradicane from the surface. This is not generally a problem.

12. MOVEMENT IN SOIL: Eradicane will move readily in the soil.

13. GRAZING AND CROPPING RESTRICTIONS:

Drift: Danger from drift is low

Grazing Restrictions: None

Crop Use after hail: No restrictions

Succeeding Crops: No restrictions

14. TOXICITY:

Fish and Wildlife: Oral LD₅₀ Rats - 1652 mg/kg

Bees: Not applicable

15. SAFETY AND PRECAUTIONS: Harmful if swallowed. Avoid contact with skin, eyes and clothing. Avoid breathing spray mist.

First Aid: Ingestion may produce symptoms. Absorption through skin or inhalation of quantities sufficient to produce poisoning is unlikely.

1. If ingested, **do not** induce vomiting.
2. Call a physician.

For Physician:

1. **Do not** induce vomiting or lavage stomach.
2. Give symptomatic and supportive treatment.

16. STORAGE: Eradicane does not require heated storage and is not affected by freezing temperatures. It should, however, be stored away from all seeds and fertilizers.

17. WHERE AVAILABLE: Eradicane 8-E can be purchased from almost all of the grain companies and from many independent farm supply dealers.

Additional information available from:

Chipman Inc.

P.O. Box 965

Winnipeg, Manitoba

R3C 2V5

Phone: (204) 786-3421

ESTAPROP (2,4-D + Dichlorprop)

1. FORMULATION: Emulsifiable concentrate 300 g/L dichlorprop and 300 g/L 2,4-D. Available in 20 litre containers.
2. REGISTERED MIXES: None
3. CROPS: Spring and Winter Wheat and Barley

Underseeding: Legume underseeding not recommended.

4. WEEDS CONTROLLED: Bluebur, buckwheat (Tartary and wild), cocklebur, flixweed, kochia, lamb's-quarters, mustard (ball, dog, hare's-ear, Indian, tumbling, wild, wormseed), oakleaved goosefoot, pigweed (redroot and Russian), ragweeds, Russian thistle, shepherd's-purse, smartweeds (annual), sow-thistle (annual), stinkweed, stork's-bill
5. WEEDS SUPPRESSED: Canada thistle, curled dock, perennial sowthistle
6. WHEN USED:
 - Between the 4 leaf and flag-leaf stage for spring seeded crops
 - Between full tillering and flag-leaf for fall seeded crops
7. HOW TO APPLY:

With: No application restrictions specified
Rate: 1.75 L/ha (a 20 litre container will treat 11.5 ha)
Water Volume: 50-200 L/ha
Pressure: Sufficient for good coverage
Nozzles: 50-200 litre nozzles providing uniform spray coverage
Protective Equipment: Standard protective equipment used when applying herbicides.

8. SPRAYING TIPS: None specified
9. HOW IT WORKS: Estaprop is a systemic herbicide which is absorbed by leaf and stem surfaces and concentrated in the growing region of the weed. Here it disrupts all division and increases respiration. This results in stoppage of growth, twisting and curling of leaves and stems, browning and eventual death.
10. EXPECTED RESULTS: Twisting and curling of weeds will commence 2-10 days after application depending on weather conditions.

Conditions under which poor results may be expected

1. Poor coverage
2. Low relative humidity during and after spraying

11. EFFECT OF RAINFALL: No information available.
12. MOVEMENT IN SOIL: Not applicable.
13. GRAZING AND CROPPING RESTRICTIONS:

Drift: Drift onto crops such as peas, beans, sugar beets, tomatoes, clover, alfalfa, rape, sunflowers, potatoes, turnips, garden flowers, trees and shrubs will cause injury.

Grazing Restrictions: No information available.

14. TOXICITY: Mice - Acute Oral LD₅₀ 400 mg/kg
Bees - Information unavailable
15. SAFETY AND PRECAUTIONS: Harmful if swallowed or inhaled. Avoid contact with skin, eyes or clothing.

First Aid: If swallowed, **do not** induce vomiting but rush patient to nearest hospital taking labelled container. In case of skin contact remove contaminated clothing and wash skin thoroughly with soap and water. If in eyes, flush with plenty of water for 15 minutes and take patient to hospital at once. This product contains petroleum distillates.

16. STORAGE: May be stored at any temperature. Shake well after storing for one year or longer.
17. WHERE AVAILABLE: Niagara Dealers

Additional information available from:

Niagara Chemical, Division of Reichhold Limited
1274 Plains Road East, Box 5004
Burlington, Ontario
L7R 3Z1
Phone: (416) 634-2355

GRAMOXONE (paraquat)

1. FORMULATIONS: Water soluble solution 200 g/litre
Available in 5 litre containers and 1 litre containers
2. REGISTERED MIXES: None applicable to Alberta

Mix Restriction: Not applicable
Mixing with other Pesticides: Not recommended
3. CROPS: Shelterbelts, stale seedbed for vegetables and field crops, potatoes, non-crop land, and chemical mowing.
4. WEEDS CONTROLLED: The herbicidal effect varies with weed species, hence repeat applications may be necessary on certain perennial weeds. Annual weeds are generally killed with one application if the weed growth has been completely covered with the spray solution.
5. WEEDS SUPPRESSED: Most perennial weeds.
6. WHEN USED: Generally prior to the emergence of a crop, but after weeds emerge. For the best result use Gramoxone at an early stage of the weed's development.
7. HOW TO APPLY:

With: Ground equipment only.

Rate: **Grass and Weed Control in Shelterbelts:** Rate and method of application - apply 5.5 L Gramoxone in 1100 litres per sprayed hectare or 0.075 L in 10 L of water per 100 m². 0.55 L of this mixture will treat an area 1.75 m in diameter around a tree.

Weed Growth by Stale Bed Technique for Vegetable & Field Crops: Pre-emergent to crop. Post-emergent to weeds: For weed control in beans (all types), beets, carrots, cole crops, corn, cucumbers, onion, peas, potatoes, soybeans, and turnips, prepare a seed bed at least 2-4 weeks before seeding to stimulate weed growth. Seed without further cultivation and with a minimum disturbance of soil. To burn off emerged weeds apply 2.75-5.5 L Gramoxone in 300-1100 L of water per hectare prior to or after seeding. Do not apply later than 3 days before crop emergence. Use 5.5 L when weeds are above 5 cm in height, and higher volume of water on dense weed growth.

Potatoes: Apply up to ground crack only for Netted Gems and Cherokee. For other varieties apply up to the time the first potato tops have reached 5-8 cm. Apply 2.75-4.25 L in 300-550 L of water per hectare for control of quack grass, annual grasses and broadleaf weeds. To control emerged seedling grasses and broadleaf weeds use only 1.5 L in 300-550 L of clean water.

Note: Application to exposed or emerged potato foliage will cause temporary injury and chlorosis. Do not apply to emerged potato foliage in the evening, or when potatoes are under moisture stress due to extremely dry soil conditions, or to early potatoes. The use of poor or diseased seed and cut seed with one eye will make potatoes more susceptible to injury by post-emergence Gramoxone sprays. This treatment will normally eliminate several cultivations, but has no residual action and will not control growth of weeds which may take place following the application of Gramoxone.

Weed Control in Non-Crop Land: Gramoxone will provide a rapid top kill of weeds and grasses when applied as a foliar spray. Apply 5.5-11 L of Gramoxone in 550-1100 litres of water per hectare, thoroughly wetting all foliage.

Chemical Mowing: For rapid scorch of weeds and grasses, apply 2.75 L of Gramoxone in 550-1100 L of water per hectare, thoroughly wetting all foliage. This rate may also be used with some residual herbicides to improve the initial top kill of the residual herbicide.

For Weed Control in Non-Crop Land and Chemical Mowing: Gramoxone may be added to tank mixes of certain residual herbicides where immediate top kill and long-term sterilization is required. The use of such combinations for the above two uses, should be based on previous experimental experience, and recommendations on the label of the residual herbicide.

Water Volume: Given in above section. Thoroughly wet all foliage. For dense weed growth use the higher volume of water.

Incorporation: Not applicable

Pressure: 300 kPa

Ground Speed: 9 km/h

Nozzles: All standard nozzles delivering the correct volume.

Protective

Equipment: Prevent skin or eye contact and do not breathe spray mist - wear rubber gloves, approved face mask and eye shield when handling the concentrate.

8. SPRAYING TIPS: Use high volume, low pressure type spraying equipment to apply the appropriate number of litres per hectare. Foliage must be thoroughly covered to obtain good results. Special equipment is necessary for use on some row crops. This equipment shields the crops from the spray.

Applications made on cloudy days, during dull sunlight or just prior to or during periods of darkness will generally increase the subsequent effectiveness of the treatment.

Do not apply with mist blowers.

It is important to thoroughly wash equipment after spraying - use a wetting agent (Agral 90 at 60 mL per 100L of water), flush and spray out, then thoroughly rinse with clean water. When possible, the equipment should be filled with clean water and left overnight. Spray out before storing equipment or using for other materials.

9. HOW IT WORKS:

Gramoxone is absorbed by all leaf and stem surfaces, but it does not move in the plant. Once inside the plant, Gramoxone interferes with the photosynthetic process of the plant. This is followed by yellowing and eventual death of the plant.

10. EXPECTED RESULTS:

Weeds: Gramoxone provides immediate, fast and virtually complete annual weed kill with only one application in most cases.

Repeat applications may be necessary when dealing with perennial weeds. Usually yellowing will occur within a few hours of application. Desiccation of the plant will continue rapidly and eventual death will occur.

Crop: Gramoxone is inactivated on contact with the soil, therefore it has no residual effect in the soil.

In fruit crops and shelterbelts, Gramoxone should be applied to the base of trees, bushes, canes and vines. Avoid contact with foliage, fruit, young growing shoots, suckers and green bark. Care must be taken to avoid contact with desirable green foliage when interim weeding. In potatoes, application to exposed or emerged potato foliage will cause temporary injury and chlorosis. Do not apply to emerged potato foliage in the evening, or when potatoes are under moisture stress due to extremely dry soil conditions, or to early potatoes. The use of poor or diseased seed and cut seed with one eye will make potatoes more susceptible to injury by post-emergence Gramoxone sprays.

Condition under which poor results may be expected:

1. Rain prior to the spray solution drying on plant.
2. Use clean (non-turbid) water for spraying Gramoxone. Muddy water will reduce the effectiveness of the chemical.
3. Inadequate coverage of green foliage.

11. EFFECTS OF RAINFALL:

Once the spray solution has dried on the plant tissue, rain will not reduce the effectiveness of Gramoxone.

12. MOVEMENT IN SOIL:

None

13. GRAZING AND CROPPING RESTRICTIONS:

Drift: Avoid application or drift onto crops, ornamental plants, lawns, grazing areas or other desirable growth.

Grazing restrictions: Not applicable

Crop use after Hail: No restriction

Succeeding Crops: No restriction

14. TOXICITY:

Human: High if concentrate or dilute solution ingested

Fish & Wildlife: Acute oral LD₅₀ rat: 120 mg paraquat ion/kg

Bees: Not applicable.

15. SAFETY AND PRECAUTIONS:

First Aid: If swallowed, induce vomiting if not already occurring. Get to nearest hospital FAST. THIS IS ESSENTIAL. If delay unavoidable, administer fluids and induce further vomiting. If in eyes, flush with clean water for 15 minutes and get medical attention. If on skin, wash thoroughly with water. Remove contaminated clothing immediately; wash before re-use.

For Physician: If swallowed, give stomach wash-out and test urine and gastric aspirate for paraquat. If positive, give up to 1 litre of adsorbent suspension (30% Fuller's Earth, activated charcoal or amberlite resin) mixed with a purgative (MgSO₄, NaSO₄ or mannitol). Repeat administration of adsorbent suspension for the next 24 hours, plus purgative as required. Maintain and monitor electrolyte and fluid status daily. Consider haemodialysis or haemoperfusion using charcoal column. Delay oxygen as long as possible. If in eyes, treat symptomatically, using antibiotics and steroids as necessary. Emergency telephone numbers 416/643-4123, 8:00 a.m. - 4:45 p.m. After hours 416/528-6771 (state as calling for Chipman).

16. STORAGE: Gramoxone will crystalize if subjected to freezing temperatures. It, therefore, requires heated storage.

17. WHERE AVAILABLE: Gramoxone is available from almost all major grain companies and from many independent farm supply dealers.

Additional information available from:

Chipman Inc.
P.O. Box 965
Winnipeg, Manitoba
R3C 2V5
Phone: (204) 786-3421

HERBEC 20P (tebuthiuron)

1. FORMULATIONS: 20% Pellets
Available in 20 kg. drums

2. REGISTERED MIXES: None registered

Mix Restrictions: Not applicable.

Mixing with Other Pesticides: Not recommended.

3. CROPS: Areas where industrial brush control is required.

4. WEEDS CONTROLLED: Alder, balsam fir, birch, hard hack, pine, poplar, spruce (black, white), tamarack, willows

5. WEEDS SUPPRESSED: Not applicable.

6. WHEN USED: Herbec 20P may be applied any time that the ground is not frozen or snow-covered; however, summer and fall applications will not control brush well into the next year.

7. HOW TO APPLY:

With: Air or ground granular applicator.

Rate: 17 to 22 kg/ha

Water Volume: Not applicable

Incorporation: Not applicable

Pressure: Not applicable

Ground Speed: Not restricted

Nozzles: Not applicable

Protective

Equipment: Standard protective equipment used when applying herbicides.

8. SPRAYING TIPS:

- a) Do not use on or near field crops, desirable trees or shrubs, on areas into which their roots may extend, or in locations where the chemical may be washed into contact with their roots, as injury or death may occur.
- b) To get the best control, the granular applicator must be properly calibrated to distribute the pellets uniformly.

9. HOW IT WORKS: Herbec 20P must be taken up by the root of the target species. It kills the plant by inhibiting photosynthesis. Herbec 20P is applied to the soil surface and is moved into the soil by rainfall. This product moves slowly downward into the soil and the rate of movement depends upon soil-type, amount of rainfall and environmental factors. Brush kill occurs when the Herbec is brought into contact with the tree roots. Shallow-rooted brush species will be killed more quickly than deep-rooted species.

10. EXPECTED RESULTS: Herbec 20P will not provide rapid brush defoliation. Product applied in the summer and fall of one year will start to control brush later on in the following year. The speed of kill will depend upon the amount of rainfall, soil-type, environmental conditions and depth of rooting. Shallow rooting, sandy soil and high rainfall encourage more rapid kill. Some brush species may undergo repeated defoliation until completely killed. This complete kill may come as late as 24 to 36 months after application. Maximum brush control may be expected 24 months after application.

Herbec is specifically designed for the control of brush. Because Herbec is a concentrated pellet and the number of pellets per acre is very low, the effect on ground cover is minimal.

Conditions under which poor results may be expected:

- 1. application onto frozen ground
- 2. improper rate

11. EFFECT OF RAINFALL: Moisture will carry Herbec 20P into the soil and bring it into contact with tree roots. Increased rainfall will increase the speed at which this product kills brush.

12. MOVEMENT IN THE SOIL: To be effective Herbec 20P must be leached into the root zone of the brush. Movement in the soil is vertical and not lateral. Depth of leaching rarely goes beyond 18 inches.

13. GRAZING AND CROPPING RESTRICTIONS:

Drift: Not applicable

Grazing Restriction: Do not graze land treated with Herbec 20P.

Crop use after Hail: Not applicable.

Succeeding Crops: Herbec 20P is an industrial brush control product for use in areas where no agricultural crops are to be planted.

14. TOXICITY: Oral Acute LD₅₀ (rat) - 644 ± 27 mg/kg
Oral Subacute - 162 days: Cattle: no effect at 100 ppm
Dermal - Rabbit: 200 mg/kg no dermal irritation
Eye - Rabbit: 71 mg/kg produced no significant effects
15. SAFETY AND PRECAUTIONS: Harmful if swallowed. Avoid contact with skin, eyes or clothing. In case of contact, flush with water.
16. STORAGE: Store in a dry area.
17. WHERE AVAILABLE:

Additional information available from:

Elanco Products Division
Eli Lilly and Co (Canada) Ltd.
B-13, 6020 - 2nd Street, S.E.
Calgary, Alberta
T2H 2L8
Phone: (403) 253-9056

HOE-GRASS (diclofop-methyl)

1. FORMULATION: Emulsifiable concentrate containing 190 g/L (present as methyl ester). Available in 20 litre containers.
2. REGISTERED MIXES: Hoe-grass + bromoxynil (Torch, Pardner)

Mixing with other pesticides: Not recommended.

3. CROPS: Winter, durum and spring wheat, barley (except Klages and Betzes), flax, rapeseed, tame mustard, field peas, lentils, tame buckwheat, spring rye, fall rye, alfalfa*, clover (red and sweet)*, crested wheat grass*, Russian wild rye grass*, creeping red fescue*, intermediate wheat grass*, triticale**.

* year of establishment only

** temporary registration only; full registration is pending

Tank-Mix: Hoe-Grass: Bromoxynil (Torch or Pardner) can only be used on wheat, barley (except for varieties Klages and Betzes) and flax (apply when flax is 5-10 cm in height.).

4. WEEDS CONTROLLED: Wild oats, yellow and green foxtail, barnyard grass, Persian dandel and volunteer corn.
5. WEEDS SUPPRESSED: None
6. WHEN USED:

1-4 leaf stage of wild oats, green and yellow foxtail, barnyard grass, volunteer corn. 1-3 leaf stage of Persian dandel. Barley must be sprayed in the 1-4 leaf stage of the crops and not more than 21 days after emergence of the barley.

7. HOW TO APPLY:

With: Ground or aircraft equipment

Rate: 3.75 L/ha. One 20 litre pail treats 5.33 ha at the 3.75 L/ha rate.

Water Volume: Aircraft - minimum of 35 litres/ha

Ground - 100 litres/ha

Incorporation: Not applicable

Pressure: Aircraft - 300 kPa, ground - 275 kPa

Ground Speed: 9 km/h

Nozzles: Ground - use of 80° stainless steel flat fan nozzles is recommended for optimum spray coverage. Do not use flood jet nozzles.
Aircraft - use nozzles that will produce small droplet size (150-250 micron range). Do not use raindrop nozzles.

Protective

Equipment: Use of protective eye equipment and safety equipment is recommended.

8. SPRAYING TIPS:

- Nozzles should be tilted 45° forward to ensure better coverage.
- When tank mixing with bromoxynil (Torch or Pardner) if grassy weed is in correct stage before broadleaf weeds have emerged, do not delay Hoe-Grass applications.
- During periods of stress (for example very hot (28°C) and/or dry conditions, or very low humidity), plants are not actively growing. Application of Hoe-Grass during these periods may result in significantly reduced weed control. Even further reduction may be evident if using Hoe-Grass + Bromoxynil (Torch or Pardner) tank mix under these conditions than if Hoe-Grass is used alone.
- Do not mix Hoe-Grass with any other herbicides (except Bromoxynil), insecticides, fungicides, fertilizers or any other chemicals or additives.
- Hoe-Grass must be applied before the use of any broadleaf herbicide (except Torch or Pardner). A time interval of 4 days after application of Hoe-Grass is required to eliminate a reduction of grassy weed control.

9. HOW IT WORKS:

Hoe-Grass possesses contact as well as systemic action. Uptake is primarily through the leaves. Penetration and uptake via roots is also possible, providing the soil is sufficiently moist and the rate of application is relatively high. The site of Hoe-Grass action is the growing point and thus the herbicide should be applied near this point by directing the spray 45° forward.

10. EXPECTED RESULTS:

Yellowing of susceptible plants becomes noticeable within 2-4 days after application. New leaf growth exhibits lighter yellow blotches (chlorosis). The chlorosis deepens and browning develops within 10-14 days after application. At this point photosynthesis and growth are inhibited and uptake of water and nutrients ceases.

Lack of adequate crown root development is one of the most distinguishable features of diclofop methyl activity, and is evident on the wild oats as well as in some barley varieties, for which Hoe-Grass is not recommended.

Conditions under which poor results may be expected:

1. Rain within one hour of application
2. Low rate of Hoe-Grass
3. Plants are under stress conditions
4. Use of raindrop or flood-jet nozzles
5. Tank mixes with insecticides, fertilizers or herbicides (other than Torch or Pardner) will reduce control.

Precautions: Barley - Hoe-Grass must be applied in the 1 to 4 leaf stage of the barley and prior to tillering (usually not later than 21 days after the emergence of the crop). Application beyond the 4-leaf stage or after tillering (stooling) will result in crop damage. Under certain environmental conditions, yellow blotches may appear on the barley leaves. These blotches will be rapidly outgrown and will not affect maturity or yield. **DO NOT APPLY HOE-GRASS TO KLAGES OR BETZES BARLEY VARIETIES.** Application of Hoe-Grass on barley after recommended crop stage can contribute to lodging of the crop.

CAUTION: Application of Hoe-Grass **MUST** take place before tillering (stooling) of the grassy weeds. Poor weed control will result if application is made past tillering.

CAUTION: Good spray coverage is essential for optimum weed control especially in areas of heavy grassy weed populations.

11. **AFFECT OF RAINFALL:** Rainfall within one hour will decrease activity.

12. **MOVEMENT IN SOIL:** Some movement in soil if sufficient moisture is present.

13. **CROPPING AND GRAZING RESTRICTIONS:**

Drift: Danger from drift is low since only oats and corn are susceptible crops. Shelterbelts and gardens should not be damaged although direct contact should be avoided.

Grazing restriction: Do not graze treated green crop.

Succeeding crops: No restriction.

14. **TOXICITY:** While Hoe-Grass is a safe product to handle, contact with eyes, skin or clothing should be avoided. Hoe-Grass is toxic to fish. Do not contaminate water supplies, irrigation ditches, ponds, lakes or streams.

TEST	ANIMAL	RESULTS
Oral LD ₅₀	Rat	2140 mg/kg
Dermal LD ₅₀	Rat	5000 mg/kg
LC ₅₀ 4 day	Rainbow Trout	0.42 mg/kg
LC ₅₀ 8 day	Mallard Duck	20,000 mg/kg

15. **SAFETY AND PRECAUTIONS:** Avoid contact with eyes, skin or clothing. Avoid breathing spray mist. Use of protective eye equipment is highly recommended.

First Aid: If swallowed, **do not** induce vomiting but rush patient to nearest hospital taking original container with you. In case of skin contact, remove contaminated clothing and wash skin thoroughly with soap and water. If in eyes, flush with plenty of water for 15 minutes and take patient to hospital at once. This product contains petroleum distillates.

16. **STORAGE:** Do not store below freezing. If stored for one year or longer, shake well before using.

17. **WHERE AVAILABLE:** Pioneer Grain, Alberta Wheat Pool, Federated Co-operatives and United Grain Growers.

Additional information available from:

Hoechst Canada Inc.
645 Park Street
Regina, Saskatchewan
S4N 5N1
Phone: (306) 545-8166

New Hoe-Grass Registrations
(February, 1981)

Triticale, dry common beans, fababeans, soybeans, sunflowers, potatoes, seedling brome grass (year of establishment only), processing peas, onions (dry bulb).
See label for rates.

KERB 50W (benzamide)

1. FORMULATIONS: 50% Wettable powder
Available in 2.0 kg containers
2. REGISTERED MIXES: None specified
3. CROPS: Alfalfa, bird's-foot trefoil (first year and established plantings).
4. WEEDS CONTROLLED: Annual grass (including volunteer grain and wild oats), chickweed, orchardgrass, quackgrass, timothy
5. WEEDS SUPPRESSED: None
6. WHEN USED: Fall application - alfalfa, trefoil. Spring application - alfalfa seed crops
7. HOW TO APPLY:

With: Ground equipment
Rate: 1.75 kg/ha - Annual grasses, volunteer grain, wild oats - fall (or spring alfalfa seed crops) application
2.25-3.25 kg/ha - Quackgrass, orchardgrass, timothy, chickweed - fall application.
Water Volume: 300-500 L/ha
Incorporation: Spring application on alfalfa seed crops-if soil temperature is high and moisture content low at time of application, a light incorporation is recommended.
Pressure: Standard low pressure (275 kPa)
Ground Speed: 9 km/h
Nozzles: Flat fan nozzles delivering 300-500 L/ha
Protective Equipment: Standard protective equipment used when applying herbicides.

8. SPRAYING TIPS:

Fall application: Timing depends on soil temperature and ground freezing. Best results are obtained when soil temperature is low but above freezing, and soil moisture is high. Surface applications are most effective if followed by rain in a day or two or a light overhead irrigation (1.25-2.5 cm).

Spring application: Soil temperature should be cool for optimum control.

9. HOW IT WORKS: Kerb 50W acts through root absorption.
10. EXPECTED RESULTS: Not specified.
11. EFFECTS OF RAINFALL: See "spraying tips"
12. MOVEMENT IN SOIL: Not specified
13. GRAZING AND CROPPING RESTRICTIONS:

Grazing Restrictions: Do not harvest or graze within 90 days after application of 3.25 kg/ha Kerb 50-W or 60 days after rates of less than 3.25 kg/ha

Succeeding Crops: To avoid injury to subsequent crops in the rotation, wait 9 months before planting other crops in Kerb treated soil.

14. TOXICITY: Not specified.
15. SAFETY AND PRECAUTIONS: Avoid breathing dust or spray mist. Do not take internally. Do not get in eyes or on skin.
First Aid: In case of contact, flush eyes and skin with plenty of water; for eyes, get medical attention.
16. STORAGE: Store in a cool, dry place.
17. WHERE AVAILABLE:

Additional information available from:

Rohm and Haas Canada Ltd.
Prairies Regional Office
Suite #14, 830 King Edward Street
Winnipeg, Manitoba
R3H 0P5
Phone: (204) 774-1755

KIL-MOR (2,4-D, mecoprop and dicamba)

1. **FORMULATIONS:** Water soluble solution containing 310 g/L 2,4-D, 80 g/L mecoprop and 110 g/L dicamba. Available in 4 L containers.
2. **REGISTERED MIXES:** Kil-Mor 1.1 L plus Atrazine 80 W 1.75 kg per hectare in corn.
3. **CROPS:** Spring (including durum) and winter wheat, oats, barley, sweet and field corn.

Underseeding: Not recommended.

4. **WEEDS CONTROLLED:**

In crops: Bindweed (hedge), buckwheat (wild), cocklebur, corn spurry, cow cockle, flax, flixweed, knotweed, lamb's quarters, mustards, peppergrass, pigweed (prostrate and redroot), Russian thistle, shepherd's purse, smartweeds (annual), sow-thistle (annual), stinkweed.

Along roadsides: Alders, bull thistle, chicory, goat's beard, poison ivy, ragwort, white cockle.

5. **WEEDS SUPPRESSED:** Field bindweed, Canada thistle

6. **WHEN USED:**

Spring wheat - 3-5 leaf stage

Winter wheat - in spring before crop is 30 cm high

Oats - 3-4 leaf stage

Barley - 2-3 leaf stage

Corn - Overall spray prior to 15 cm height of corn, use drop nozzles after 15 cm height

Roadsides - In spring when weeds are growing actively

Weed growth stage - 2-5 leaf stage

NOTE: Treatment at other than recommended crop stage may cause injury.

7. **HOW TO APPLY:**

With: Ground equipment

Rate: Spring wheat - 0.85-1.1 L/ha

Winter wheat - 0.85-1.1 L/ha

Oats - 0.85-1.1 L/ha

Barley - 0.85 L/ha

Sweet corn - 0.85-1.1 L/ha

Roadsides - 3.25 L/ha

(At 0.85 L/ha rate, one 4 L container will treat 4.7 ha)

Water Volume: 100 L/ha

Incorporation: Not applicable

Pressure: Sufficient to ensure complete coverage

Ground Speed: Sufficient to ensure complete coverage

Nozzles: All standard and low pressure nozzles delivering recommended volume.

Protective

Equipment: Standard protective equipment used when applying herbicides.

8. **SPRAYING TIPS:**

1. Barley is the most sensitive crop to Kil-Mor. Ensure that proper rate, water volume and timing is used otherwise crop injury may occur.
2. Risk of crop injury increases as water volume drops below 90 L/ha.

9. **HOW IT WORKS:** Kil-Mor is a combination of three systemic hormonal herbicides which accumulate in the growing points of susceptible plants and produce abnormal growth resulting in the disruption of the transport system in plants. Movement to these growing points is slow.

10. **EXPECTED RESULTS:**

Weeds: Due to the slow translocation of the chemical in the plant and the influence of growing conditions, effect on weeds becomes visible within 7-14 days after spraying — leaves curl, leaf petioles twist, leaf edges turn brown, whole plant ceases growth and eventually turns brown and dies.

Crop: Improper applications can result in abnormal bending at the internodes of grain stalks, difficulty in head emergence from sheath, curled awns, malformed kernels and sterile florets.

Conditions under which poor results may be expected:

1. Inadequate coverage
2. Rainfall shortly after application
3. Weeds overmature

11. EFFECTS OF RAINFALL: Do not spray if rain is expected within 6 hours.

12. MOVEMENT IN SOIL: Not applicable

13. GRAZING OR CROPPING RESTRICTIONS:

Drift: Tomatoes, sugar beets, sunflowers, beans, turnips, cauliflower, cabbage, ornamentals and fruit crops are very sensitive to drift.

Grazing Restrictions: No haying or grazing restrictions at recommended rate.

Crop use after hail: No restrictions

Succeeding crops: No restrictions

14. TOXICITY:

Fish & Wildlife: Rat - Acute Oral LD₅₀ - 1028 mg/kg

Rainbow trout: median tolerated limit 96 hours - 28,000 ppm

Bees: LD₅₀ for dicamba alone 3.6 micrograms/bee

15. SAFETY AND PRECAUTIONS: Effects of overexposure: Loss of appetite, loss of weight, vomiting, depression, general tenseness and muscular weakness.

Emergency and first aid procedures: Ingestion - Drink 1 or 2 glasses of water and induce vomiting by touching back of throat with finger or blunt object. Do not induce vomiting or give anything by mouth to an unconscious person. Inhalation - Remove to fresh air. Apply artificial respiration if necessary. Eye Contact - Flush with water for 15 minutes. Skin contact - Wash with mild soap and water. In all emergency and first aid situations call a physician.

16. STORAGE: Heated storage only.

17. WHERE AVAILABLE: Green Cross Dealers

Additional information available from:

Green Cross Products
820 - 26 Street N.E.
Calgary, Alberta
T2A 2M4
Phone: (403) 273-5656

LASSO (alachlor)

1. FORMULATION: Emulsifiable concentrate; 480 g/L (20 litre pail)
Granular 15% (22.7 kg bags)

2. REGISTERED MIXES: Lasso + Atrazine preplant incorporated

Mixing Restrictions: Thorough and uniform mixing is required.

Mixing with other pesticides: Not recommended.

3. CROPS: Corn

Underseeding: Not recommended

4. WEEDS CONTROLLED: Green foxtail, lamb's quarters, redroot pigweed

5. WEEDS SUPPRESSED: If broadleaf weeds present, tank mix is recommended.

6. WHEN USED:

- Spring - Pre-plant incorporated on corn in southern Alberta soils with less than 3% organic matter.
- Early post or surface applications are generally not recommended in southern Alberta.

7. HOW TO APPLY:

With: Ground sprayer

Rate:	Crops	Soil	Liquid (L/ha)	Granules (kg/ha)
	Corn	Sandy	6	22.5
		Loam & Clay	7	25

Water Volume: 150 L/ha or more

Incorporation: Time - as soon as possible before seeding
Implements - A double disc working at 7-10 cm followed by a harrow or shallow incorporation with a spring-tine harrow followed immediately by 3-6 cm of irrigation water or rain

Pressure: 150-275 kPa

Nozzles: All flat fan or floodjet nozzles delivering 150 L/ha or more of water.

Protective

Equipment: To avoid contact with skin or eyes wear rubber gloves and goggles when handling and wash thoroughly after use.

8. SPRAYING TIPS:

- Incorporation equipment (disc recommended) should be set to cut at 7 cm so that the herbicide is distributed in the top 5 cm of soil.
- The herbicide must be uniformly incorporated by operating disc at 8 to 10 km/h and avoid working soils that are excessively moist.
- Use 50 mesh screens particularly when spraying the Lasso + Atrazine tank-mix.

9. HOW IT WORKS: Applied prior to germination, Lasso is absorbed by green foxtail shoots usually resulting in death before emerging through the soil surface. Excessively high rainfall or irrigation (12 cm or more) will result in early loss of control.

10. EXPECTED RESULTS:

Weeds: Lasso will control green foxtail as it germinates and before it emerges, generally for up to 8-10 weeks after application.

Crop: No injury has been observed in Alberta when used within recommended label rates.

Conditions under which less than satisfactory results may be expected:

1. Poor incorporation due to wet, cloddy soil or poor mixing action and speed, and resultant stripping.
2. Delaying incorporation until weed emergence occurs.
3. Very dry soil conditions.

11. EFFECTS OF RAINFALL: Moisture is required for optimum control but excessive rainfall or irrigation (above 10 cm) will reduce length of control.

12. MOVEMENT IN SOIL: Lasso is mobile in soil under excessive rainfall or irrigation.

13. GRAZING AND CROPPING RESTRICTIONS:

Drift: No effect on standing crops

Grazing restrictions: None (Lasso is metabolized in plants almost completely within 10 days).

Crop use after hail: No restrictions

Succeeding crops: No carryover and no cropping restrictions

14. TOXICITY: Oral LD₅₀ - rat 1800 mg/kg

15. SAFETY AND PRECAUTIONS: Either EC or 10 G may cause allergic skin reaction.

First Aid: Induce vomiting if swallowed. In case of a medical emergency involving a Monsanto herbicide call the following number collect at anytime - (314) 694-4000.

16. STORAGE: Store above 0°C to keep from freezing. Freezing will result in crystals which will settle to the bottom of the can. Place in a warm room (22°C) and roll or shake the can frequently over a period of several days.

17. WHERE AVAILABLE:

Additional information available from:

Monsanto Canada Inc.
#205, 610 - 70 Avenue S.E.
Calgary, Alberta
T2H 2J6
Phone: (403) 253-3541

LEXONE (metribuzin)

1. FORMULATIONS: Lexone L (480 g/L) (Available in 10 litre containers)
Lexone D.F. (75% dry flowable). (Available in 2.5 kg containers)

2. REGISTERED MIXES: Lexone (both forms) + MCPA amine or Banvel

Mixing with other Pesticides: Not recommended.

3. CROPS: Wheat (hard red spring and durum), barley (except Klondike), potatoes (except varieties Tobique and Belleisle)

Underseeding: Not recommended.

4. WEEDS CONTROLLED: Chickweed, corn spurry, hemp-nettle, lamb's-quarters, smartweeds (annual) volunteer rapeseed, plus MCPA and Banvel sensitive weeds when tank mixed.

5. WEEDS SUPPRESSED: None

6. WHEN USED:

Spring wheat - 2.5 leaf stage

Barley - 2.5 leaf stage

Potatoes Lexone DF

- **pre-emergence** - Do not use on sandy or coarse textured soils containing less than 1% organic matter as crop injury may result. Potato varieties vary in their resistance to "Lexone" DF. Use on limited acreage to determine safety before full acreage sprays are adopted. Apply to crop after planting (at least 5 cm deep) or hilling but before crop emerges. Apply before emerged weeds are 2-5 cm tall.

- **early post-emergence** - Treat before weeds are 2.5 cm tall and when potatoes are less than 10 cm tall. Treatment may cause some leaf burn. Do not use on red skinned or early potatoes.

- **pre-emergence plus post-emergence** - Use procedures for pre and post-emergence application but note rate restriction.

Note: Lexone DF is to be used on potatoes under irrigation only.

(Check with other herbicide for timing when applying mixtures)

Weed stage: after weeds have emerged and are small.

7. HOW TO APPLY:

With: Ground equipment

Rate: Spring wheat - Lexone L - 0.425 L/ha
Lexone DF - 275 g/ha

Both formulations of Lexone at the above rates may be tank mixed with either MCPA amine at 0.824-1.12 L/ha or Banvel at 0.275 L/ha for broader spectrum weed control.

Barley - Lexone L - 0.425-0.55 L/ha

Lexone DF - 275-350 g/ha

Both formulations of Lexone at the above rates may be tank mixed with MCPA amine 0.824-1.12 L/ha for broader spectrum weed control. All formulations of Lexone at the low rate may be tank mixed with Banvel at 0.275 L/ha for broader spectrum weed control.

Potatoes -

Pre-emergence: Make a single application of "Lexone" DF at 700 to 1400 grams per hectare. Use 335 litres water per hectare or more.

Early post-emergence: If weather conditions prevent a pre-emergent application, 700-900 grams per hectare may be applied following 3 or more successive days of sunny weather.

Pre-emergence plus post-emergence: Follow directions above but do not apply more than 1400 grams per hectare per season.

Liquid - One 10 L container treats 18 ha at 0.55 L/ha rate

Dry Flowable - One 2.5 kg container treats 9.0 at 275 g/ha rate

Water Volume: 100 L/ha

Incorporation: Not applicable

Pressure: 275 kPa

Ground Speed: 9 km/h

Nozzles: All standard nozzles delivering approximately 100 L/ha. Do not use flood-jet nozzle. Stainless steel nozzles are recommended.

Protective

Equipment: Standard protective equipment used when applying agricultural chemicals. Goggles are recommended.

8. SPRAYING TIPS:

- 80° nozzles more efficient than 65° nozzles.
- Use 50 mesh line strainer and screens.
- Ensure pump is of sufficient capacity to supply agitation.
- Do not spray if rain is expected within 2 hours.
- Allow 4-5 day interval between applications of Lexone (all formulations) and wild oat herbicides. Lexone can be applied before or after wild oat herbicides.
- If frost occurs, allow 4-5 day interval for crop to recover before applying Lexone.
- Crop must be planted at least 5 cm deep.

9. HOW IT WORKS: Lexone is a systemic herbicide which is absorbed by both the foliage and the root system of the plant. Lexone strongly inhibits photosynthesis. Affected plants are chlorotic and stunted. Death usually occurs 10-14 days after treatment. Because Lexone leaves a residue in the soil, control of shallow germinating weeds (eg. chickweed) occurs throughout the growing season.

10. EXPECTED RESULTS:

Weeds: Should start to yellow within 7-10 days after treatment. Speed will depend on growing conditions, weed control will vary depending on specific time of application and growing conditions.

Crop: Temporary (7-10 days) lightening in crop color and occasionally a slight reduction in crop height may occur, especially if frost or abnormally high temperatures occur within 1-2 days of application.

Conditions under which poor results may be expected:

1. Rainfall immediately after application
2. Weeds in poor growing state (eg. drought)
3. Weeds at a too advanced stage
4. Poor coverage

11. EFFECTS OF RAINFALL: Heavy rainfall immediately after application may decrease activity.

12. MOVEMENT IN SOIL: Not applicable.

13. GRAZING AND CROPPING RESTRICTIONS:

Drift: Sensitive crops such as rapeseed, mustard, sugar beets can be seriously hurt by drift.

Grazing Restrictions: Do not apply within 60 days of harvest. Do not graze or feed to livestock within 30 days of application.

Succeeding crops: No restrictions Note: Potatoes - Lexone DF - do not apply within 60 days of harvest.

14. TOXICITY:

Fish & Wildlife -

Rats and LD₅₀ - 1100-1200 mg/kg

Rainbow trout LC₅₀ - 100 ppm for 96 hrs.

Bees - Low

15. SAFETY AND PRECAUTIONS: May be harmful if inhaled or swallowed. Avoid breathing dust or spray mist. Avoid contact with skin, eyes and clothing. Wear goggles when handling. Wash thoroughly with soap and water after handling.

16. STORAGE:

Lexone DF - Store in a cool dry place

Lexone L - It is preferable to store Lexone L in warm storage. Activity is not affected if frozen. However, ensure material has been thoroughly mixed before using.

17. AVAILBLE FROM: Federated Co-op, Niagara, Oliver Industrial Supply, Cargill Grain & United Farmers of Alberta, Alberta Wheat Pool.

Additional information available from:

Dupont Canada Inc.
Suite 300 Center 70
7015 MacLeod Trail South
(P.O. Box 5848 Station A)
Calgary, Alberta
T2H 2K6
Phone: (403) 259-4640

LOROX (linuron)

1. FORMULATIONS: Lorox L - 0.48 kg/litre (available in 10 litre containers)

2. REGISTERED MIXES: Lorox L + MCPA amine

Mixing with other pesticides: Not recommended

3. CROPS: Hard red spring and durum wheat, barley, oats, flax, carrots, asparagus, potatoes, shelterbelts and fruit trees (peach, apple, pear, plum, cherry)

Underseeding: Not recommended.

4. WEEDS CONTROLLED: Annual smartweeds, buckwheat (tartary and wild), chickweed, corn spurry, cow cockle, goosefoot, groundsel, hempnettle, knotweed, kochia, lamb's-quarters, mustard (wild, wormseed), pigweed, purslane, ragweed, shepherd's purse, sow-thistle (annual), stinkweed, stork's-bill, wild radish.

5. WEEDS SUPPRESSED: Green foxtail, Canada thistle

6. WHEN USED: 2-4 leaf stage of weeds, 1-3 leaf stage of green foxtail

Crop stage: Cereals 2-4 leaf stage
Flax - 5-10 cm in height
Carrots (post-emergence) 2 or more fully developed true leaves, 10-15 cm in height
Asparagus - immediately after discing, before emergence, may be repeated after last cutting
Potatoes (pre-emergence) - before weedy grasses are 8 cm tall and broadleaf weeds 15 cm tall
Shelterbelts - Apply only on stock planted for at least one year as a directed spray under trees and bushes. Apply before weeds are 10 cm high and before buds open in spring.
Fruit trees - Apply as a directed spray under trees before weeds are 10 cm high. Use only where trees have been established in the orchard for at least 10 years (1 year for peach trees)

7. HOW TO APPLY:

With: Ground equipment
Rate: Cereals and flax - Lorox L at 0.425-0.55 L/ha plus 0.85-1.1 L/ha MCPA amine
Carrots - Pre-emergence (crop) - 1.1-3.4 L/ha in 200-300 L water/ha. Post-emergence (crop) - 2.25-4.5 L/ha in 200-300 L water/ha. Combination pre and postemergence (crop) - 1.1-2.25 L/ha followed by 2.25-4.5 L/ha, provided treatments are at least two weeks apart.
Asparagus - Pre-emergence (crop) - 3.4-4.5 L/ha in 300 L water/ha
Potatoes - Pre-emergence (crop) - 2.25-4.5 L/ha in 300 L water/ha
Shelterbelts - single application of 4.5 L/ha
Fruit trees - single application of 9.0 L Lorox L plus surfactant in 400-600 L/ha water (At 0.55 L/ha rate, one 10 L container will treat 18 ha).
Water Volume: 100 L/ha
Incorporation: Not applicable
Pressure: 275 kPa
Ground Speed: 9 km/h
Nozzles: All standard nozzles delivering approximately 100 L/ha. Do not use flood-jet nozzles. Stainless steel nozzles are recommended.
Protective Equipment: Standard protective equipment used when applying herbicides.

8. SPRAYING TIPS:

- 80° nozzles more efficient than 65° nozzles.
- Use 50 mesh line strainers and screens.
- Ensure pump is of sufficient capacity to supply agitation.
- Do not spray if rain is expected within 2 hours.
- Fruit trees - avoid contact with fruit, foliage, and green bark with spray or drift as injury may result.

9. HOW IT WORKS: Lorox is a systemic herbicide which is absorbed through both the foliage and the root system of the plant. Once in the plant, its mode of action is to strongly inhibit photosynthesis. Outward appearance of affected plants is chlorosis (yellowing), stunting and finally death which occurs 10-14 days after treatment.

10. EXPECTED RESULTS:

Weeds: Yellowing will start within 7-10 days after application. Speed will depend on temperature and moisture conditions. Effect is greatest when growing conditions are excellent. Weed control will vary depending on species, time of application and growing conditions.

Crop: A slight yellowing of the crop mainly due to leaf tip and leaf margin burn may be seen 7-10 days after application. This usually is not visible after 14-18 days.

Conditions under which poor results may be expected:

1. Rainfall within 2 hours of application
2. Weeds in a poor growing state (eg. drought)
3. Weeds too mature
4. Poor coverage

11. **EFFECTS OF RAINFALL:** Heavy rainfall within 2 hours may decrease activity.

12. **MOVEMENT IN SOIL:** Not applicable.

13. **GRAZING AND CROPPING RESTRICTIONS:**

Drift: Sensitive crops such as rapeseed, mustard, sugar beets, shelterbelts, and gardens can be seriously hurt by drift.

Grazing restrictions: Do not feed green plants to livestock.

Succeeding crops: No restrictions.

14. **TOXICITY:**

Fish & Wildlife - Rats LD₅₀ - 1500 mg/kg
- Rainbow trout LC₅₀ - 16 ppm for 96 hrs.

Bees: Non toxic

15. **SAFETY AND PRECAUTIONS:** May irritate eyes, nose, throat and skin. Avoid breathing dust or spray mist. May be harmful if swallowed. Wash thoroughly with soap and water after use.

16. **STORAGE:**

Lorox L - Store in a heated area. Do not freeze as settling may occur. If frozen thoroughly mix to ensure uniformity. Activity is not affected if frozen.

17. **AVAILABLE FROM:** Alberta Wheat Pool, United Grain Growers, United Farmers of Alberta, Federated Co-op, Oliver Industrial Supply, Green Cross, Niagara, Cargill Grain, Pioneer Grain.

Additional information available from:

Dupont Canada Inc.
Suite 300 Centre 70
7015 MacLeod Trail South
P.O. Box 5848, Station A
Calgary, Alberta
T2H 2K6
Phone: (403) 259-4640

MALORAN (chlorbromuron)

1. **FORMULATIONS:** Maloran is available as a 50% wettable powder in 2.5 kg packaging.
2. **REGISTERED MIXES:** Maloran + Dual Ciba-Geigy (do not use on potato variety "Superior")
Maloran + Lasso 4.8EC
Maloran + Gramoxone
3. **CROPS:** Carrots, potatoes
4. **WEEDS CONTROLLED:**
Grasses: Annual bluegrass, barnyard grass, green foxtail
Broadleaf: Annual wormwood, common chickweed, groundsel, lamb's quarters, mustard, pigweed, purslane, ragweed, shepherd's purse, wild buckwheat, smartweeds (annual)
5. **WEEDS SUPPRESSED:** Annual grasses.
6. **WHEN USED:** Carrots - apply pre-emergence or early post-emergence to crop or weeds.
Potatoes - apply at planting or preferably after first hilling either pre-emergence to weeds or crop or preferably early post-emergence to weeds and pre-emergence to crop. (maximum 10% of sprouts showing)
7. **HOW TO APPLY:**

With:	Ground equipment
Rate:	Carrots - 2.25-4.5 (5.5 in muck soils) kg/ha Potatoes - 3.25-5.5 (6.75 in muck soils) kg/ha (At 2.25 kg/ha rate, one 2.5 kg bag will treat 1.1 ha)
Water Volume:	300-400 L/ha
Incorporation:	Do not incorporate Maloran.
Pressure:	275 kPa
Ground Speed:	9 km/h
Nozzles:	Standard nozzles delivering a uniform pattern and capable of an output of 300-400 L/ha at 275 kPa.
Protective Equipment:	Standard protective equipment used when applying herbicides.
8. **SPRAYING TIPS:**
 - If spray mixture is allowed to settle at any time, thorough agitation is required to resuspend the mixture before spraying is resumed.
 - Use nozzle screens of 50 mesh size or larger.
 - Keep by-pass line on or near bottom of tank to minimize foaming.
 - Use maximum label rates where grassy weeds are common.
 - Do not tank mix with carrot oil or any surfactant.
9. **HOW IT WORKS:** Maloran is a systemic herbicide which is absorbed by both the foliage and the root system of the weeds. Maloran strongly inhibits photosynthesis. Affected plants are chlorotic and stunted.
10. **EXPECTED RESULTS:** Maloran has pre-emergence and high postemergence activity. It has a medium residual effect against annual weeds. Pre-emergence application of Maloran must have rain or irrigation to carry the chemical into the soil where weeds sprout. If some weed seedlings escape preemergence treatments in dry weather, a shallow cultivation will be necessary to smother them. A weed should be considered a pre-emergence escape when it has reached the 2-3 leaf stage (2.5-5.0 cm).
11. **EFFECTS OF RAINFALL:** Excessive rainfall after application may result in inadequate weed control.
12. **MOVEMENT IN SOIL:** Can occur in light sandy soils and soils low in organic matter. In both cases heavy rainfall is required to cause movement.
13. **GRAZING AND CROPPING RESTRICTIONS:**
 - Do not use the mixture of Maloran/Dual on the potato variety "Superior".
 - Do not incorporate Maloran/Dual mixtures.
 - Do not use mixtures of Maloran/Lasso or Maloran/Dual on sandy soils of less than 3% organic matter.
 - Do not apply if heavy rain is expected.
 - Do not plant crops other than Corn within 6 months of applying combination treatments.
14. **TOXICITY:**
Chlobromuron technical.
Acute oral LD₅₀ - male and female albino rats - 2150 mg/kg.
Acute dermal LD₅₀ - rabbits - 10,000 mg/kg.
Eye irritation - rabbits - moderately irritating.

Maloran 50WP

Acute oral LD₅₀ - rats - 8,000 mg/kg

Acute dermal LD₅₀ - rabbits - 3,000 mg/kg

Eye irritation - rabbits - moderately irritating.

Maloran is practically non-toxic to mammals.

15. SAFETY AND PRECAUTIONS:

First Aid: If swallowed, get medical attention immediately.

For Physician: If Maloran is ingested accidentally, there is no specific antidote. Induce emesis or lavage stomach. Give a saline laxative and supportive therapy. In case of contact with skin, wash with soap and water. In case of contact with eyes, flush with plenty of water for at least 15 minutes and get medical attention.

16. STORAGE: Keep material dry - no other special conditions.

17. AVAILABLE FROM: All Green Cross Product Dealers

Additional information available from:

Green Cross Products
820 - 26 Street N.E.
Calgary, Alberta
T2A 2M4
Phone: (403) 273-5656

MATAVEN (flamprop methyl)

1. **FORMULATION:** Liquid emulsifiable concentrate, 105 g/L
Available in 20 litre steel cans

2. **REGISTERED MIXES:**

Registered mixes: Mataven + MCPA amine or ester

Mix instructions: Add the required amount of Mataven to half the required water volume in the spray tank, start agitation, then add the balance of the water. The resulting emulsion is relatively stable, requiring only gentle agitation. If the emulsion is allowed to stand unused for several hours, the spray may require agitation to re-emulsify.

Mix restrictions: Majority of wild oats in the 5 leaf stage

- maximum dose of MCPA not to exceed 550 g active ingredient/ha.
- wild oat infestation less than 120 plants/sq. m²
- 100 litres water (minimum)
- no aerial application
- crop competition is necessary for optimum control

Mixing with other pesticides: Not recommended.

3. **CROPS:** All spring, winter and durum wheats, except Selkirk.

Underseeding: Not recommended.

4. **WEEDS CONTROLLED:** Wild oats

5. **WEEDS SUPPRESSED:** None

6. **WHEN USED:** 3-leaf to shot blade stage of the wild oats; wild oats at the 2-leaf stage and younger may escape control and grow to maturity. The wheat crop at the time of application should not be beyond the six leaf stage.

7. **HOW TO APPLY:**

With:	Aircraft or ground equipment
Rate:	5.0 L/ha (One 20 litre can treats 4 ha)
Incorporation:	Not applicable
Water Volume:	Aircraft - minimum - 20 L/ha Ground - 50-100 L/ha
Nozzles:	All standard nozzles delivering between 50-100 L/ha at 9 km/h
Pressure:	300 kPa
Protective Equipment:	Standard protective equipment used when applying herbicides. Safety goggles are recommended.

8. **SPRAYING TIPS:**

Timing:	Best results with Mataven will probably be obtained when the majority of wild oats are at the 3-4 leaf stage, but before the shot blade stage. Excellent weed control and optimum yield increases will result in this timing.
Broadleaf Herbicides:	Wild oat control can be substantially reduced if Mataven is tank-mixed with broadleaf herbicides. For best wild oat control, allow an interval of 4 days between the application of Mataven and the use of MCPA, Torch, Blagal, Buctril M or Brominal M and an interval of 7 days with the use of 2,4-D or Banvel formulations. (Some reduction in wild oat control may take place with the Mataven + MCPA tank-mix when it is applied at the 5 leaf stage of the wild oats).
Water Volume:	The higher 100 L/ha spray volume is highly recommended. It will provide better coverage, resulting in better control of wild oats, especially where there is a heavy crop canopy or dense growth of wild oats.
Boom Angle:	Direct spray pattern 45° forward to enhance spray penetration. Ensure boom height is such that the spray from adjacent nozzles meets just above the wild oats.
Tank Mixes:	Add MCPA when tank is ¼ full and Mataven when tank is ¾ full. Agitate before using.
Rainfall:	Do not apply if rainfall is expected within 2 hours.
Aircraft:	Do not spray when winds are greater than 15 km/h, avoid overlapping.

9. **HOW IT WORKS:** Mataven is a systemic herbicide which achieves a high degree of control when applied to wild oats between the 3 leaf to shot blade stages. Mataven enters the wild oat through the leaves and is converted to a biologically active acid. This acid is readily transported from the leaves to the growing point in the stem. Here, cell elongation is inhibited and cell initiation and division is impaired. The wild oat is killed, or stunted to such a degree that it is unable to compete with the crop.

10. EXPECTED RESULTS:

Wild oat performance: Mataven, used as recommended, consistently gives wild oat control of 90% and greater. The other 10% or less of so-called "escapes" are not strong, vigorous wild oat plants producing 100 or more seeds per plant, but are small, stunted wild oats with few shrivelled seeds.

Wild oat symptoms: The wild oats will turn a dark bluegreen color approximately 10 days after spraying. Later the wild oats turn yellow and brown. Wild oats in the 1-2 leaf stage at application will often appear controlled but will usually escape and grow to maturity.

Crop: Selkirk wheat is the only variety to show damage from the application of Mataven.

Conditions under which poor results may be expected:

1. Rainfall within 2 hours of application
2. Too low a rate of Mataven
3. Poor wild oat coverage due to low water volume, low pressure, wind, heavy crop canopy or a combination of these factors.
4. Application too early - many wild oats with less than 3 leaves at application.
5. Tank-mix application before 4-5 leaf stage or with a non-recommended product.

11. **EFFECT OF RAINFALL:** Rainfall within 12 hours of application will reduce effectiveness.

12. **MOVEMENT IN SOIL:** Not applicable

13. GRAZING AND CROPPING RESTRICTIONS

Drift: Drift potential is low from ground and air application as long as standard practices and common sense are used. Oats would be the most seriously affected crop.

Grazing Restrictions: Do not graze treated areas.

Use after hail: Do not graze or feed to livestock.

Succeeding Crops: No restrictions.

14. TOXICITY:

Humans: Mataven is of a low order of acute oral, percutaneous and inhalation toxicity. Mataven is non-irritating and non-sensitizing although the emulsifiable concentrate exhibits skin and eye irritation effects characteristic of the solvent in the formulation.

Fish and Wildlife: acute oral LD₅₀ (rat) - 5000 mg/kg

acute dermal LD₅₀ (rabbit) - 2000 mg/kg

Bees: Non-toxic.

15. **SAFETY AND PRECAUTIONS:** If spilled on the skin, remove all contaminated clothing at once. Thoroughly wash skin with soap and water. Contact physician. Wash contaminated clothing before re-use. If the material gets into the eyes, flush immediately with running water for at least 15 minutes. Contact physician.

First Aid: This product contains petroleum distillate. If swallowed **do not** induce vomiting. If patient is unconscious, give him air. Keep patient prone and quiet. Transport the patient immediately to the nearest physician.

16. **STORAGE:** Mataven may crystallize if stored at temperatures below 0°C and therefore, heated storage is recommended. If the product is frozen there is no loss of activity as long as the frozen product is warmed and vigorously shaken or agitated before being added to the water in the spray tank.

17. **WHERE AVAILABLE:** Mataven is available from Shell Farm Supply dealers, Co-op Farm Supply Centres, United Grain Growers, Pioneer Grain and many independent agrochemical dealers.

Additional information available from:

Shell Canada Ltd.
Agrochemicals Development
Box 400, Terminal "A"
Toronto, Ontario
M5W 1E1
Phone: Winnipeg (204) 775-4997

MCPA (amine)

1. **FORMULATIONS:** 500 g/L present as dimethylamine salt
Available in 20 litre containers
2. **REGISTERED MIXES:** MCPA + Sweep
MCPA + Torch
MCPA + Pardner
MCPA + Sencor
MCPA + Lexone
MCPA + Afolan F
MCPA + TCA
MCPA + Mataven
MCPA + Lorox

Mixing Restrictions: Insure that the proper formulation of MCPA is used with the product considered for mixing.

Mixing with other Pesticides: Not recommended.

3. **CROPS:** Hard red spring, durum and winter wheat, barley, oats, fall rye, flax, asparagus, peas (field and processing), pastures and non-cropland. **NOTE:** See product label for restrictions on some crops and weeds controlled.

Underseeding: Not recommended.

4. **WEEDS CONTROLLED:** American dragonhead, biennial wormwood, bluebur, cocklebur, common burdock, flixweed, goat's beard, goosefoot, hairy galinsoga, lamb's-quarters, mustard (ball, dog, hare's-ear, tumble, wild, wormseed), pepper-grass (common), pigweed (tumble), pineapple weed, purslane, ragweed (common), stinkweed, thyme-leaved spurge.
5. **WEEDS SUPPRESSED:** Annual smartweed, buckwheat (Tartary and wild), Canada thistle, hemp-nettle, knapweed (Russian), leafy spurge, plantain (common), pigweed (Russian and redroot), shepherd's-purse, sow-thistle (annual and perennial), wild radish.
6. **WHEN USED:**

Spring wheat, barley, oats - 4 leaf to just before flag leaf

Winter cereals (+ fall rye) - before crop tillering in the spring

Flax - from 5 cm height to just before bud formation

Peas - when crop is 10-18 cm tall (with not less than 170 L/ha water)

Asparagus - following cultivation just before first spears appear. Treatment may be repeated at the end of cutting season.

Pastures - before growth of grasses and legumes in spring.

7. **HOW TO APPLY:**

With: Ground equipment or aircraft

Rate: Wheat, barley, oats, rye, flax - 0.7-1.75 L/ha. (One 20 litre container will treat 28.5 ha at the 0.7 L/ha rate)

Asparagus - 3.5 L/ha

Peas - 0.70 L/ha

Pastures - 1.1-2.0 L/ha

Water Volume: Aircraft - minimum 20 L water/ha

Ground equipment - 40-100 L water/ha

Incorporation: Not applicable

Pressure: 275 kPa

Ground Speed: 9 km/h

Nozzles: All standard and low pressure nozzles delivering 100 L/ha

Protective

Equipment: Standard protective equipment used when applying herbicides.

8. **SPRAYING TIPS:**

- Drift from spray can be reduced by using high volume sprays under low pressure, coarse sprays and drop nozzles.
- Do not spray during windy conditions or when air temperature is above 27°C.
- Do not spray if rain is expected within 4 hours.
- Avoid spray drift to sensitive crops.
- Extremely hard water may reduce performance or cause problems in spraying the product.
- Application before or after recommended stage may result in crop injury.

9. **HOW IT WORKS:** MCPA is a systemic herbicide which is absorbed by all leaf and stem surfaces. It is translocated throughout the plant and concentrates in the actively growing region of the plant. MCPA disrupts cell division, causing abnormal growth response, as well as affecting respiration and food reserves. This is followed by twisting of the weeds and their eventual death.

10. EXPECTED RESULTS:

Weeds: Weeds start to show twisting effects between 2 to 20 days after spraying, depending on weather conditions, formulation and weeds. Following the twisting and bending, plants will turn brown and then die. Only those weeds that are emerged at time of spraying will be controlled.

Crops: Yellowing and thinning of the crop may be noticed if higher than recommended rates are applied. Generally speaking MCPA is easier on the crop than is 2,4-D. Note: Consult label for cautions concerning use of higher rates on certain crops.

Conditions under which poor results may be expected:

1. Rain within 4 hours of application.
2. Use of extremely hard water in the spray tank.

11. EFFECTS OF RAINFALL: Rain within 4 hours of spraying will decrease activity.

12. MOVEMENT IN SOIL: Not applicable.

13. GRAZING AND CROPPING RESTRICTIONS:

Drift: Danger from drift is lower than from ester but avoid drift onto susceptible crops such as rapeseed, mustard, sunflowers, potatoes, shelterbelts and gardens.

Grazing Restrictions: Do not graze dairy cattle within 7 days after spraying.

14. TOXICITY: Fish and Wildlife: Rat - LD₅₀ - 800 mg/kg
Bluegill LC₅₀ for 47 hrs - 1.5 mg/l

15. SAFETY AND PRECAUTIONS: Causes irritation of skin and eyes. Effects of overexposure - Extreme case: muscular weakness, vomiting, perspiration.

First Aid: In case of contact, flush eyes with plenty of water for at least 15 minutes and get medical attention. Wash skin with soap and plenty of water. If swallowed, induce vomiting. GET MEDICAL ATTENTION.

16. STORAGE: If the product was stored under freezing conditions, warm to 5°C and mix well before using.

17. WHERE AVAILABLE: Various formulations of MCPA are available from all major suppliers of agricultural chemicals.

Additional information available from:

Uniroyal Chemical
4, 1323 - 44 Ave. N.E.
Calgary, Alberta
T2E 6L5
Phone: (403) 276-9481

Dow Chemical of Canada Ltd.
Suite 2412, 10025 Jasper Ave.
Edmonton, Alberta
T5J 1S6
Phone: (403) 428-0439

OR manufacturer of brand purchased.

MCPA (ester)

1. FORMULATIONS: 500 g/L present as mixed butyl esters.
Available in 20 litre containers

2. REGISTERED MIXES: MCPA + Avenge
MCPA + Sweep
MCPA + Torch
MCPA + Pardner
MCPA + Mataven

Mixing Restrictions: Insure that the proper formulation of MCPA is used with the product considered for mixing.

Mixing with other Pesticides: Not recommended.

3. CROPS: Spring and winter wheat, barley, oats, rye, flax, pastures and non-cropland.

Underseeding: Not recommended.

4. WEEDS CONTROLLED: Common ragweed, lamb's-quarters, mustard (ball, hare's-ear, tumble, wild, wormseed), stinkweed.

5. WEEDS SUPPRESSED: Buckwheat (Tartary and wild), Canada thistle, common plantain, hemp-nettle, knapweed (Russian), leafy spurge, pigweed (redroot and Russian), shepherd's purse, smartweeds (annual), sow-thistle (annual and perennial), wild radish.

6. WHEN USED:

Spring wheat, barley, oats - 4 leaf to just before flag leaf

Winter cereals - before crop tillering in the spring

Flax - from 5 cm height to just before bud formation

Pastures - treat before growth of legumes and grasses starts in spring

7. HOW TO APPLY:

With: Ground equipment or aircraft

Rate: Wheat, barley, oats, rye, flax - 0.70-1.75 L/ha. Pastures - 1.1-2.0 L/ha. (One 20 L pail will treat 28.6 ha at 0.70 L/ha rate)

Water Volume: Aircraft - minimum of 20 L/ha Ground equipment - 40-100 L/ha

Incorporation: Not applicable

Pressure: 275 kPa

Ground Speed: 9 km/h

Nozzles: All standard and low pressure nozzles delivering 40-100 L/ha

Protective

Equipment: Standard protective equipment used when applying herbicides.

8. SPRAYING TIPS:

- Drift from spray can be reduced by using high volume sprays under low pressure, coarse sprays and drop nozzles.
- Do not spray during windy conditions or when air temperature is above 27°C.
- Do not spray if rain is expected within 2 hours.
- Avoid spray drift to sensitive crops.
- Extremely hard water may reduce performance or cause problems in spraying the product.
- Application before or after recommended stage may result in crop injury.

9. HOW IT WORKS: MCPA is a systemic herbicide which is absorbed by all leaf and stem surfaces. It is translocated throughout the plant and concentrates in the actively growing region of the plant. MCPA disrupts cell division, causing abnormal growth response, as well as affecting respiration and food reserves. This is followed by twisting of the weeds and their eventual death.

10. EXPECTED RESULTS:

Weeds: Weeds start to show twisting effects between 2 to 20 days after spraying, depending on weather conditions, formulation and weeds. Following the twisting and bending, plants will turn brown and then die. Only those weeds that are emerged at time of spraying will be controlled.

Crops: Yellowing and thinning of the crop may be noticed if higher than recommended rates are applied. Generally speaking, MCPA is easier on the crop than is 2,4-D. Note: Consult label for cautions concerning use of higher rates on certain crops.

Conditions under which poor results may be expected:

1. Rain within 2 hours of application.
2. Use of extremely hard water in the spray tank.

11. EFFECTS OF RAINFALL: Rain within 2 hours of spraying will decrease activity.

12. MOVEMENT IN SOIL: Not applicable.

13. GRAZING AND CROPPING RESTRICTIONS:

Drift: Danger from drift is high. Avoid drift onto susceptible crops such as rapeseed, mustard, sunflowers, potatoes, shelterbelts and gardens.

Grazing Restrictions: Do not graze dairy cattle within 7 days after spraying.

14. TOXICITY: Fish and Wildlife: Rat - LD₅₀ - 800 mg/kg
Bluegill LC₅₀ for 48 hrs - 1.5 mg/L

15. SAFETY AND PRECAUTIONS: Causes irritation of skin and eyes.

First Aid: In case of contact, flush eyes with plenty of water for at least 15 minutes and get medical attention. If swallowed, get medical attention, **do not** induce vomiting.

16. STORAGE: Do not freeze. If subjected to freezing, warm to at least 5°C and mix thoroughly.

17. WHERE AVAILABLE: Various formulations of MCPA are available from all major suppliers of agricultural chemicals

Additional information available from:

Dow Chemical of Canada Ltd.
Suite 2412, 10025 Jasper Ave
Edmonton, Alberta
T5J 1S6
Phone: (403) 428-0439

Uniroyal Chemical
4, 1323 - 44 Avenue N.E.
Calgary, Alberta
T2E 6L5
Phone: (403) 276-9481

OR the manufacturer of the brand purchased.

MCPA (salts)

1. FORMULATIONS: 400 g/L present as a potassium salt.
300 g/L present as a sodium salt.
(Both available in 20 litre containers).

2. REGISTERED MIXES: MCPA (sodium salt) + TCA
MCPA (potassium salt) + Banvel

Mixing Restrictions: Ensure that the proper formulation of MCPA is used with the product considered for mixing.
Mixing with other Pesticides: Not recommended.

3. CROPS: Wheat, barley, oats, flax, (rye, asparagus, peas, pastures and non-cropland - MCPA Sodium salt 300 only)

Underseeding: Not recommended.

4. WEEDS CONTROLLED: Common ragweed, lamb's-quarters, mustard (ball, hare's-ear, tumble, wild, wormseed), stinkweed
5. WEEDS SUPPRESSED: Bluebur, buckwheat (Tartary and wild), Canada thistle, common plantain, hemp-nettle, knapweed (Russian), leafy spurge, pigweed (redroot and Russian), shepherd's purse, smartweeds (annual), sow-thistle (annual and perennial), wild radish.

6. WHEN USED: (Crop stage)

	MCPA sodium salt	MCPA potassium salt
Spring wheat, barley, oats	4 leaf to just before flag leaf	2-6 leaf stage, depending on rate (see label)
Winter cereals	Before crop tillering in the spring	Not recommended
Flax	From 5 cm height to just before bud formation	5-10 cm high
Asparagus	Following a cultivation just before first spears appear, treatment may be repeated at end of cutting season.	Not recommended
Peas	When peas are 10-18 cm tall with not less than 150 L/ha water	Not recommended
Pastures	Before growth of legumes and grasses starts in spring	Not recommended

7. HOW TO APPLY:

With:	Ground equipment or aircraft		
Rate:	NOTE: higher rates recommended for hard to kill weeds may cause crop damage.		
		MCPA sodium salt	MCPA potassium salt
	Spring wheat, oats, barley	1.2-2.75 L/ha	1.5-2.0 L/ha
	Winter cereals (+ rye), flax	1.2-2.75 L/ha	Not recommended
	Asparagus	5.5 L/ha	Not recommended
	Peas	1.5 L/ha	Not recommended
	Pastures	1.75-3.25 L/ha	Not recommended
	(One 20 litre container will treat 16.2 ha at 1.2 L/ha rate)		
Water Volume:	Aircraft - minimum 20 L/ha Ground Equipment - 100 L/ha		
Incorporation:	Not applicable		
Pressure:	275 kPa		
Ground Speed:	9 km/h		
Nozzles:	All standard and low pressure nozzles delivering 100 L/ha		
Protective Equipment:	Standard protective equipment used when applying herbicides.		

8. SPRAYING TIPS:

- Drift from spray can be reduced by using high volume sprays under low pressure, coarse sprays and drop nozzles.
- Do not spray during windy conditions or when air temperature is above 27°C.
- Do not spray if rain is expected within 6 hours.
- Avoid spray drift to sensitive crops.
- Extremely hard water may reduce performance or cause problems in spraying the product.
- Application before or after recommended stage may result in crop injury.

9. HOW IT WORKS: MCPA is a systemic herbicide which is absorbed by all leaf and stem surfaces. It is translocated throughout the plant and concentrates in the actively growing region of the plant. MCPA disrupts cell division, causing abnormal growth response, as well as affecting respiration and food reserves. This is followed by twisting of the weeds and their eventual death.

10. EXPECTED RESULTS:

Weeds: Weeds start to show twisting effects between 2 and 10 days after spraying, depending on weather conditions, formulation and weeds. Following the twisting and bending, plants will turn brown and then die. Only those weeds that are emerged at time of spraying will be controlled.

Crops: Yellowing and thinning of the crop may be noticed if higher than recommended rates are applied. Generally speaking, MCPA is easier on the crop than is 2,4-D.

Conditions under which poor results may be expected:

1. Rain within 6 hours of application.
2. Use of extremely hard water in the spray tank.

11. EFFECTS OF RAINFALL: Rain within 6 hours of spraying will decrease activity.

12. MOVEMENT IN SOIL: Not applicable.

13. GRAZING AND CROPPING RESTRICTIONS:

Drift: Danger from drift is lower than from ester or amines but avoid drift onto susceptible crops such as rapeseed, mustard, sunflowers, potatoes, shelterbelts and gardens.

Grazing Restrictions: Do not graze dairy cattle within 7 days after spraying.

14. TOXICITY: Fish and Wildlife: Rat LD₅₀ - 800 mg/kg
Bluegill LC₅₀ for 48 hrs.- 1.5 mg/L

15. SAFETY AND PRECAUTIONS: Causes irritation of skin and eyes.

First Aid: In case of contact, flush eyes with plenty of water for at least 15 minutes and get medical attention. If swallowed, induce vomiting, get prompt medical attention.

16. STORAGE: If the product was stored under freezing conditions warm to 5°C and mix well before using.

17. WHERE AVAILABLE: Various formulations of MCPA are available from all major suppliers of agricultural chemicals.

Additional information available from:

Dow Chemical of Canada Ltd.
Suite 2412, 10025 Jasper Ave.
Edmonton, Alberta
T5J 1S6
Phone: (403) 428-0439

Uniroyal Chemical
4, 1323 - 44 Avenue N.E.
Calgary, Alberta
T2E 6L5
Phone: (403) 276-9481

OR the manufacturer of the brand purchased.

MECOTURF (mecoprop)

1. FORMULATIONS: Water soluble solution 150 g/L active ingredient
Available in 4 and 20 litre containers.

2. REGISTERED MIXES: No tank mixes recommended.

3. CROPS: Wheat, barley, oats, lawns and turf

Underseeding: Not recommended.

4. WEEDS CONTROLLED: Blackmedic, buttercup, clover, chickweed, corn spurry, dandelion, plantain, stitchwort

5. WEEDS SUPPRESSED: Canada thistle

6. WHEN USED: Between the 3 leaf and early flag leaf stage.

7. HOW TO APPLY:

With: Ground equipment

Rate: Cereals - 5.5-7 L/ha

Lawns, turf - 5.5-8.5 L/ha

Water Volume: Cereals - 200-300 L/ha

Lawns, turf - 200-400 L/ha

Incorporation: Not applicable

Pressure: 300 kPa

Ground Speed: 9 km/h

Nozzles: No restrictions with the 200-300 litre capacity.

Protective

Equipment: Standard protective equipment used when applying herbicides.

8. SPRAYING TIPS: Recommended water volume is essential for optimum weed control. See label for specific instructions concerning lawns and turf.

9. HOW IT WORKS: Mecoprop is a systemic herbicide within the MCPA group which is slower acting. Like other members of this herbicide group mecoprop interferes with the breakdown of nucleic acids and disrupts the translocation system in the plants due to abnormal cell growth, causing the accumulation of plant food in the shoots and subsequent starvation of the roots.

10. EXPECTED RESULTS:

Weeds: Some leaf curling and stem and petiole twisting should be visible within 4-5 days after spraying. Weeds should be completely dead within 3-4 weeks of application.

Crop: Wheat, barley, and oats have a high tolerance to mecoprop applied at the recommended rates and water volume. Deformed heads, missing florets and twisted awns could result if recommendations are not followed or if stressed environmental conditions occur.

Conditions under which poor results may be expected:

1. Water volumes lower than 200 L/ha will result in reduced control.
2. Cold weather and drought cause a delay in weed control action.

11. EFFECTS OF RAINFALL: Decreased effectiveness will result if rain occurs within 4-6 hrs.

12. MOVEMENT IN SOIL: Not applicable

13. GRAZING AND CROPPING RESTRICTIONS:

Drift: Since it is a salt formulation danger of vapor drift is low. Droplet drift should be avoided.

Grazing Restrictions: None specified

Crop Use after Hail: None specified

Succeeding Crops: No restrictions

14. TOXICITY:

Acute Oral LD₅₀ rat - 1060 mg/kg

Bees - not available

15. SAFETY AND PRECAUTIONS: Avoid contact with skin, eyes or clothing. Harmful if swallowed or inhaled.
16. STORAGE: Do not store at temperatures below 0°C. If stored for 1 year or longer, shake well before using.
17. WHERE AVAILABLE: Niagara Dealers

Additional information available from:

Niagara Chemical
Division of Reichhold Ltd.
1274 Plains Road East
Burlington, Ontario
L7R 3Z1
Phone: (416) 634-2355

NEOBYNE (barban)

1. FORMULATIONS: Emulsifiable concentrate 125 g/L, 250 g/L
Available in 4 gallon containers.

2. REGISTERED MIXES: Do not mix with other herbicides.

Mixing with other pesticides: Not recommended.

3. CROPS: Barley, spring wheat**, rapeseed, mustard, flax, sunflower, peas (field and processing), fababeans, lentils, alfalfa, red clover, alsike clover***, sweet clover, smooth brome grass, timothy*, Russian wild ryegrass, creeping red fescue* and crested wheatgrass*.

* Seed stands only.

** Including durum - Neobyne 250 is not recommended for use on "Park" variety

*** Neobyne 125 only.

Underseeding: Neobyne can be used on the above underseeded to one or more of the above forage legume and grass species.

4. WEED CONTROLLED: Wild oats

5. WEEDS SUPPRESSED: None

6. WHEN USED: When the majority of wild oats are in the two leaf stage but before the crop reaches the following growth stages:

Barley, lentils	Before the fourth leaf appears or before the 14th day after emergence.
Spring wheat	Before the fourth leaf appears or before the 14th day after emergence.
Flax	After the 2 (true) leaf stage but before the 12th leaf appears and before the 14th day after emergence.
Peas	Before the 6th leaf appears.
Forage legumes and grasses	Before the 4th leaf appears (NOTE: Timothy, creeping red fescue and crested wheat grass - seed stands and in year of seeding only)
Rapeseed, mustard, sunflower, fababeans	May be sprayed at any time the wild oats are in the two leaf stage.

7. HOW TO APPLY:

With:	Aircraft or ground equipment
Rate:	To all crops except wheat, apply 2.25-3.5 L/ha Neobyne 125, 1.0-1.75 L/ha Neobyne 250. To spring wheat, apply 2.25-3.5 L/ha Neobyne 125, 1.0 L/ha Neobyne 250. On all crops, use lower rate only under good growing conditions, when the wild oats have reached the two leaf stage in less than 10 days after emergence. Use the high rate on heavy infestations (535 or more wild oat plants per sq. metre) under poor growing conditions, or when wild oats have been injured by frost or wind.
Water Volume:	Aircraft: minimum 20 L/ha Ground equipment: 45 L/ha
Incorporation:	Not applicable
Pressure:	300 kPa (minimum)
Ground Speed:	6.5 km/h
Nozzles:	Tee Jet 650067, 730077, 80067 Monarch 20 and 22, Spray Jet 65.067 When wind velocity is 15-30 km/h use TK.75 or D.75 nozzles spaced at 100 cm on the boom.
Protective Equipment:	Standard protective equipment used when applying herbicides.

8. SPRAYING TIPS:

- Always make sure the sprayer is thoroughly cleaned before spraying Neobyne. This is especially important in preventing carryover of MCPA or 2,4-D into rapeseed and mustard fields.
- Wild oat seedlings will produce a new leaf every five days (with good to average growing conditions). Therefore, they will reach the two leaf stage four to nine days after emergence.
- Neobyne contains an optimum blend of surfactants and wetting agents. Therefore, additional wetting agents and surfactants are not required in the spray tank.
- Neobyne can cause skin, eye and nose irritation. Avoid prolonged and direct contact of the chemical on the skin.
- There are no restrictions on later application of other pesticides after the Neobyne treatment. However, do not make a second application at a later date on grain crops.
- Neobyne should not be applied when plants are wet with dew or rain. Dew or rain 15 minutes after spray operations will not affect the activity of Neobyne.

- To achieve good wild oat control with Neobyne, it is essential that the wild oat plants receive good coverage from the spray application. The required coverage can be obtained by:
 - Applying Neobyne in 45 litres of water per hectare.
 - Operating the sprayer at 300 kPa to ensure a good break-up of the spray into fine droplets.
 - Rotating the spray booms to direct the spray down and forward at a 45 degree angle.
 - Boom heights should be adjusted 22-25 cm above the crop to give proper coverage.

9. **HOW IT WORKS:** Neobyne is a partially systemic herbicide (some translocation in plant) which penetrates the leaf and stem surfaces of the wild oat plant and interferes with cell division in the plant. Further development of the young seed head and new leaves is stopped shortly after the two leaf wild oat plant is treated. The first symptoms of Neobyne action are a stoppage of new growth, followed by a change in the color and texture of the plant. The plant becomes brittle, the leaf tips turn brown and the plant eventually dies.

10. EXPECTED RESULTS:

Wild Oats: An immediate stoppage of new growth, with the existing leaves gradually turning a blue-green color 7-10 days after application. At the same time a swelling of the stem at ground level may also be noted. The leaf tips will turn brown, the plant becomes brittle and eventually dies 3-4 weeks after treatment. The time required for these symptoms to appear and for the wild oat plant to die is affected by crop stand, growing conditions and soil fertility.

Crop: Neobyne treatment will not affect the crop if used as directed.

Conditions under which poor results may be expected:

1. Rain within 15 minutes of application.
2. Too low an application rate of Neobyne for existing conditions.
3. Inadequate spray coverage of the wild oat plant by lower than recommended sprayer pressure, incorrect spray nozzles and improper sprayer calibration.
4. Improper timing of Neobyne application relative to the growth stage of the wild oat plants. Only the wild oat plants in the two leaf stage will be controlled.
5. Crop damage may occur if sprayed within 24 hours of a frost.

11. **EFFECTS OF RAINFALL:** Rainfall within 15 minutes of application may decrease control.

12. **MOVEMENT IN THE SOIL:** Not applicable.

13. GRAZING AND CROPPING RESTRICTIONS:

Drift: The hazard from drift is low; only common oats, buckwheat and rye can be seriously affected by drift. Do not spray when winds exceed 30 km/h.

Grazing Restrictions: Do not graze or feed crop for 5 weeks after treatment. Do not feed flax, straw or the lower 7.5 cm (stubble) of pea vines to livestock.

Crop use after Hail: Do not use crop for 5 weeks after treatment.

Succeeding Crops: No restrictions.

14. TOXICITY:

Human: Neobyne is a skin irritant and sensitizer to some people.

Albino Rats:	Active Ingredient	Formulation
Acute Oral LD ₅₀	1350 mg/kg	2750 mg/kg
Acute Dermal LD ₅₀	2300 mg/kg	3360 mg/kg

Bees: Not available

15. **SAFETY AND PRECAUTIONS:** Avoid contact with skin, eyes and clothing. Avoid breathing vapours and spray droplets.

First Aid: This product contains petroleum distillate. If swallowed **do not** induce vomiting. Get medical attention immediately. Take label or sample of product in original container to treating physician. In case of skin contact, wash immediately with soap and water. Wash thoroughly after each use. In case of eye contact, flush eyes with water for 15 minutes. Get medical attention.

16. **STORAGE:** At -40°C Neobyne thickens but does not freeze. The viscosity will return to normal as the temperature is increased. The good cold weather properties allow Neobyne to be stored in unheated storage.

17. **WHERE AVAILABLE:** Cunningham Fertilizers Ltd., Uniroyal Chemical

Additional information available from:

Fisons Corporation Ltd.
80 Melford Drive
Scarborough, Ontario
M1B 2G3
Phone: (416) 292-8700

PARDNER (bromoxynil)

1. **FORMULATIONS:** Emulsifiable concentrate 225 g/L
Available in 20 litre containers
2. **REGISTERED MIXES:** Pardner + 2,4-D
Pardner + MCPA
Pardner + Hoe-Grass
Pardner + Avenge
Pardner + Roundup
3. **CROPS:** Spring wheat (including durum), barley, oats, flax, field and sweet corn, canary seed, zero or minimum tillage
Underseeding: Not recommended.
4. **WEEDS CONTROLLED:** Buckwheat (common, Tartary and wild), cow cockle, groundsel, lamb's-quarters, mustard, Russian thistle, smartweeds (annual), stinkweed.
5. **WEEDS SUPPRESSED:** Not applicable.
6. **WHEN USED:** Spray when weeds are in the seedling stage
Cereals - 2 leaf to early flag leaf
Flax - 5 to 10 cm high
Corn - 4 to 8 leaves
Canary Grass - 3 to 5 leaves
7. **HOW TO APPLY:**
With: Ground equipment
Rate: Cereals & Corn 1.25-1.5 L/ha
Flax & Canary seed 1.25 L/ha
(A 20 litre container treats 16 ha at 1.25 L/ha)
Water Volume: 100 L/ha
Pressure: 275 kPa
Ground Speed: 9 km/h
Nozzles: All standard nozzles delivering 100 L/ha. Floodjet-type tips are not recommended.
Protective Equipment: Standard protective equipment used when applying herbicides.
8. **SPRAYING TIPS:** Spray when weeds are in the seedling stage.
9. **HOW IT WORKS:** Pardner is a contact type herbicide, therefore, good spray coverage is essential. It inhibits plant photosynthesis and respiration.
10. **EXPECTED RESULTS:** Within a few hours or several days, depending on the weather, small areas of burnt tissue will appear on the leaves of the weeds. Complete death of the weeds will be evident in 1-2 weeks.
Conditions under which poor results may be expected:
 1. Poor spray coverage.
 2. Using less than the recommended rate per hectare.
 3. Spraying flax when plants are unthrifty or under stress or in periods of hot, humid weather may cause crop damage.
 4. Spraying after the recommended growth stage of the weeds.
 5. Applying after the crop shields the weeds.
11. **EFFECTS OF RAINFALL:** No effect
12. **MOVEMENT IN SOIL:** Not applicable
13. **GRAZING AND CROPPING RESTRICTIONS:** No grazing or crop use restrictions.
14. **TOXICITY:**
Fish and Wildlife: Rat LD₅₀ - 365 mg/kg (acute oral)
Bees: Non toxic
15. **SAFETY AND PRECAUTIONS:** Do not inhale fumes and avoid breathing spray mist. Avoid contact with skin, eyes and clothing.
First Aid: If on skin, wash thoroughly with soap and water. For eyes wash with clean water or suitable eye wash for 10-15 minutes. Get medical attention.

16. STORAGE: Store in heated area. Product may crystallize if frozen. If crystallization has taken place, warm the drum in a warm room or sun with frequent agitation until crystals are dissolved.
17. WHERE AVAILABLE: Alberta Wheat Pool, Oliver, Pioneer, Cargill, Pfizer

Additional information available from:

May & Baker Canada Inc.
1147 - 17 Avenue S.W.
Calgary, Alberta
T2T 0B7
Phone: (403) 245-3148

PATORAN (metobromuron)

1. **FORMULATIONS:** Available as a 50% Wettable Powder and as a 670 g/L Flowable. The wettable powder is packaged in 2.75 kg bags and the flowable in a 20 litre pail.
2. **REGISTERED MIXES:** Patoran 670 FW plus Dual Ciba-Geigy.
Patoran 50 WP plus Dual Ciba-Geigy.
3. **CROPS:** Potatoes
4. **WEEDS CONTROLLED:** Annual bluegrass, barnyard grass, chickweed, corn spurry, green foxtail, groundsel, lamb's-quarters, mustards, pigweeds, purslane, ragweed, shepherd's-purse, smartweeds (annual), stinkweed.
5. **WEEDS SUPPRESSED:** Annual grasses.
6. **WHEN USED:**
 - Patoran 670 FW and 50 WP: apply as a pre-emergent spray (after planting but prior to emergence of crop and weeds).
 - Patoran can be applied either as:
 1. a pre-emergent spray in tank mix combination with Dual 960E.
 2. a pre-emergent spray preceded by a pre-plant incorporated spray of Dual Ciba-Geigy.

7. HOW TO APPLY:

With:	Ground equipment
Rate:	Potatoes - Patoran 50W - 3.25-5.5 kg/ha - Patoran 670 FW - 2.5-4.25 kg/ha Consult the Dual - Ciba-Geigy label for registered tank mix rate. (At 2.5 kg/ha rate, one 2.75 kg bag will treat 1.1 ha)
Water Volume:	150-300 litres/ha with Patoran 670 FW. 300-400 litres/ha with Patoran 50 W.
Incorporation:	Do not soil-incorporate Patoran.
Pressure:	275 kPa
Ground Speed:	9 km/h
Nozzles:	Use nozzles capable of delivering 150-300 L/ha in a uniform pattern at a pressure of 275 kPa. Nozzle screens should be 50 mesh size or larger. When using Patoran 50 W, use nozzles capable of delivering 300-400 L/ha.
Protective Equipment:	Standard protective equipment used when applying herbicides.

8. SPRAYING TIPS:

- Do not let spray tank contents stand for prolonged periods of time without agitation. Agitate thoroughly before recommencing operations.
 - Keep by pass line on or near the bottom of spray tank.
 - Do not apply Patoran to coarse textured soils low in organic matter.
9. **HOW IT WORKS:** Patoran is a systemic herbicide which is absorbed through the root system and once in the plant its mode of action is to strongly inhibit photosynthesis.
 10. **EXPECTED RESULTS:** Applied as a pre-emergence spray, weed emergence should be inhibited or totally absent. Under certain conditions some weed emergence and early die back can occur. The product is moisture dependent and when dry conditions occur, a light cultivation may be necessary to put the product in contact with moist soil.
 11. **EFFECTS OF RAINFALL:** None specified for potatoes.
 12. **MOVEMENT IN SOIL:** Patoran can be leached on light soils.
 13. **GRAZING AND CROPPING RESTRICTIONS:** None specified for potatoes.
 14. **TOXICITY:** Patoran 50 W

Rats	oral	LD ₅₀	5000 mg/kg
	dermal	LD ₅₀	2000 mg/kg
	inhalation (4H)	LC ₅₀	3500 mg/m ³ air

Patoran 50 W is practically non-toxic to mammals. A "repeated insult patch test" on 50 human subjects produced no evidence of sensitizing action.

Wildlife: Patoran 50 W is practically non-toxic to fish and birds. The slight toxicity to bees is of no practical importance.

15. SAFETY AND PRECAUTIONS:

First Aid: Transfer a patient to fresh air. Remove all contaminated clothes and wash contaminated skin. Immediately call a physician.

MEDICAL CARE: Gastric lavage with water or potassium permanganate solution 1:5000. Leave a solution of magnesium or sodium sulphate (15-30 g in water) in the stomach. Treat shock cautiously because of the uncertain cardiac status. Administer oxygen and apply artificial respiration if necessary. Transfusion of whole blood or washed red cells in saline may be advisable. Give stimulants or sedatives according to symptoms. Methylene blue (1% solution) 1 to 2 mg/kg i.v. or, in less severe cases, of methaemoglobinaemia 50 mg/kg orally.

16. **STORAGE:** Patoran 670 FW is freezable and should be kept in warm storage if possible. If product freezes allow to warm up at room temperature then thoroughly agitate in order to reconstitute prior to use.

17. **WHERE AVAILABLE:** Patoran 50 W and 670 FW are available at all Green Cross Dealers,

Additional information available from:

Green Cross Products
820 - 26 Street N.E.
Calgary, Alberta
T2A 2M4
Phone: (403) 273-5656

PRINCEP (simazine)

1. **FORMULATIONS:** Princep 4G and Princep Nine-T are formulations of simazine. The Princep 4G or granular formulation consists of 3.8% simazine and .2% related triazines. The Princep Nine-T is a water dispersible granule consisting of 87.6% simazine and 2.4% related triazines. Available in 4.5 kg containers.
2. **REGISTERED MIXES:** None
3. **CROPS:** Apples, pears, strawberries, loganberries, raspberries, high bush blueberries, shelterbelts, established nursery stock, forest and Christmas tree plantings, established alfalfa, established bird's-foot trefoil, corn (field and sweet), and asparagus. **OTHER USES:** Aquatic weed control (restricted use) and total vegetation control on farms.
4. **WEEDS CONTROLLED:** Princep controls both broadleaf and grassy weeds.
5. **WEEDS SUPPRESSED:** None
6. **WHEN USED:** Princep should be used just prior to or during weed emergence and may be applied in either the spring or fall.
7. **HOW TO APPLY:**

With:	Ground equipment such as the standard field or farm sprayer when using Princep Nine-T and a Cyclone spreader or other suitable mechanical applicator when using the 4G formulation.
Rate:	<p>4G</p> <p>Established nursery stock: 55-85 kg/ha in fall or spring. Shelterbelts: 110-175 kg/ha in the fall. Strawberries: new plants, 27.5 kg/ha; first year plantings, 27.5 kg/ha; bearing plants, 27.5 kg/ha (consult label for cautions) Apples and Pears - 55-110 kg/ha or 0.60-1.2 kg/100m² Forest and Christmas trees - 110-175 kg/ha Total vegetation control on farms (spot treatment) 5.5-7.5 kg/100m².</p> <p>Nine-T</p> <p>Apples and Pears - 2.5-5 kg in 300 litres/ha Loganberries - 3.75-6.0 kg in 300 litres water/ha. Raspberries - 2-2.5 kg in 200 litres water/ha Strawberries - 2 kg in 300 litres water/ha High bush blueberries - 2.5-3.75 kg/ha to base of plants in spring. Asparagus - established plantings only 2.5-3.75 kg in 300 litres water/ha. Woody ornamentals and nursery stock 2.5-3.75 kg in 300 litres water/ha. Shelterbelts - 5-7.5 kg in 500 litres of water/ha. Forest and Christmas tree plantings - 5-7 kg in 300 litres of water per hectare of ground treated. (Consult chart on label). Established alfalfa - 1.1 kg in 300 litres of water/ha (fall treatment only). Established bird's-foot trefoil - 1.1 kg in 300 litres of water/ha (fall treatment only) Corn - 1.5-2.5 kg/ha Blackberries - 2.5-3.75 kg/ha Aquatic vegetation control - Restricted uses, consult label.</p>
Water Volume:	As stated in rates.
Incorporation:	In Corn Princep may be applied one week before seeding and incorporated to a depth of 2.5 cm.
Ground Speed:	Dependent on crop and type of application.
Nozzles:	Standard spray nozzles designed to deliver recommended rates at low to medium pressure ensuring good coverage.
Pressure:	275 kPa
Protective Equipment:	Standard protective equipment used when applying herbicides.

8. **SPRAYING TIPS:**
 - Princep Nine-T
 - gentle agitation required during mixing and spraying of the Nine-T, dispersible granule.
 - use nozzle screens of 50 mesh size or larger.
 - after any break in the spray application, agitate thoroughly.
9. **HOW IT WORKS:** Princep acts through the roots of germinating weeds and inhibits photosynthesis.
10. **EXPECTED RESULTS:** Weed free treated ground.
11. **EFFECTS OF RAINFALL:** Negligible.
12. **MOVEMENT IN SOIL:** Very little movement is possible on clay soil types but on sandy ground with high rainfall some leaching can occur.

13. **GRAZING AND CROPPING RESTRICTIONS:** Allow 30 days between application and grazing of dairy, beef cattle, and sheep and 60 days between application and cutting for hay. After spraying with Princep Nine-T do not plant any crop in the treated area in the same year except corn.

14. **TOXICITY:**

General Toxicology: Toxicological investigations have shown simazine to have a very low toxicity to mammals.

Animal Toxicology: Simazine active ingredient.

Acute Oral LD₅₀ - rats and mice 5000 mg/kg

Simazine 80 w

Acute dermal LD₅₀ - rabbits 10,200 mg/kg

Eye irrigation - rabbits - moderately irritating (undiluted Simazine 80W)

Primary skin irritation - rabbits - slightly irritating.

Human Toxicology: Simazine has been tested in the laboratory and used in the field for over 17 years and no substantiated cases of skin irritation due to the chemical have been reported from either experimental or commercial use. The results of a repeated insult patch test in fifty subjects indicated that Simazine 80 w was neither a primary irritant nor a fatiguing agent and did not produce sensitization in any of the subjects tested.

Symptoms of Poisoning: No cases of poisoning in man have been reported from the ingestion of Simazine. Oral administration of 5.0 gm/kg of Simazine active ingredient, to rats produced drowsiness and irregular respiration in these animals.

15. **SAFETY AND PRECAUTIONS:**

First Aid: If swallowed, get medical attention immediately.

Treatment (for physician): If Simazine is ingested accidentally there is no specific antidote. Induce emesis or lavage stomach. Give a saline laxative and supportive therapy.

In case of contact with skin wash with soap and water. In case of contact with the eyes, flush with plenty of water for at least 15 minutes and get medical attention.

16. **STORAGE:** Store in dry area, heating not required.

17. **WHERE AVAILABLE:** All Green Cross Product Dealers.

Additional information available from:

Green Cross Products
820 - 26 Street N.E.
Calgary, Alberta
T2A 2M4

PYRAMIN (pyrazon)

1. **FORMULATION:** Flowable formulation containing 470 g/L of pyrazon in 3 litre jugs.
2. **REGISTERED MIXES:** Pyramin can be mixed with triallate (Avadex BW) or TCA
3. **CROPS:** Table beets
4. **WEEDS CONTROLLED:** Black nightshade, buckwheat (wild), chickweed, knotweed, lady's thumb, lamb's-quarters, mustard (wild, wormseed), oakleaf goosefoot, pigweed (prostrate, redroot), purslane, ragweed, shepherd's-purse, smartweed, stinkweed, wild carrot, yellow rocket.
5. **WEEDS SUPPRESSED:** None
6. **WHEN USED:** Pyramin may be used as a preplant, incorporated, pre-emergent or post-emergent treatment. However, in Alberta, a preplant incorporated treatment is recommended. Post-emergent treatments should be applied before the weeds have 3 leaves.
7. **HOW TO APPLY:**

With: Ground equipment
Rate: Light Soils - 8.25 L/ha
Heavy Soils - 10.25 L/ha
Water Volume: 100-250 L/ha
Pre-plant - Apply Pyramin in a 17.5 cm band.
Incorporation: Fall Ridging: Cover with a 15-20 cm high ridge of soil. In the spring, level the ridges and leave guide marks to enable planting the bands. Avoid levelling deeper than the chemical placement.
Pressure: 275 - 350 kPa
Ground Speed: 9 km/h
Nozzles: All standard low pressure nozzles delivering 100-250 L/ha
Protective Equipment: Standard protective equipment used when applying herbicides.

8. **SPRAYING TIPS:** The fall ridging technique seems to be the best application method in Alberta.
9. **HOW IT WORKS:** The active ingredient in Pyramin is absorbed by the roots and is translocated to the leaves.
10. **EXPECTED RESULTS:**

Weeds: If adequate moisture is present, the weeds will fail to emerge. If the soil is dry for a long period of time, weeds which emerge and become well established will not be fully controlled, but small emerged weeds may die back, once adequate moisture is present.

Crop: No effect

11. **EFFECTS OF RAINFALL:** Not applicable
12. **MOVEMENT IN SOIL:** Pyramin does not move readily in the soil and cannot be leached out.
13. **GRAZING AND CROPPING RESTRICTIONS:**

Drift: Care should be taken to avoid drift onto sensitive plants such as rapeseed and mustard.

Grazing Restrictions: The tops of beets grown in Pyramin treated soil may be used for human consumption or fed to livestock.

Cropping Restrictions: None.

14. **TOXICITY:** Fish and Wildlife: Rats - LD₅₀ - 3030 mg/kg
Bees - Non toxic

15. **SAFETY AND PRECAUTIONS:**

Symptoms of Poisoning in Humans: Not known

First Aid: If swallowed, induce vomiting. Treat symptomatically.

16. **STORAGE:** Store in a cool, dry place. Do not store below 0°C.

17. **AVAILABLE FROM:** Oliver Industrial Supply

Additional information available from:

BASF Canada Inc.
10 Constellation Court
Rexdale, Ontario
M9W 1K1
Phone: (416) 675-3611

REGLONE (diquat)

1. FORMULATION: Water soluble solution, 200 g/L
Available in 5 litre containers
2. REGISTERED MIXES: None
- Mixing with other pesticides:** Not recommended
3. CROPS: Rapeseed, flax, peas, sunflowers, mustard, potatoes, white beans, red kidney beans, soybeans, adzuki beans, alfalfa, bird's-foot trefoil, red and white Dutch clover - **used as a desiccant**
4. WEEDS CONTROLLED: Kills most weeds present at the time of application.
5. WEEDS SUPPRESSED: Not applicable

6. WHEN USED: The stage of crop development when Reglone should be applied as a desiccant varies for each crop:
 - Rapeseed - Apply by a fixed-wing aircraft when 60-75% of the seeds have turned from green to brown.
 - Mustard - Apply by a fixed-wing aircraft when 75% of the seeds have turned.
 - Flaxseed - Spray when crop has reached 75% ball turn. This is the normal swathing time. Apply by fixed-wing aircraft.
 - Sunflowers - Apply when the seeds reach maturity which is 20-50% moisture in the seed and hull. Apply by fixed-wing aircraft.
 - Field or Dry Peas - Spray by means of a fixed-wing aircraft when the crop has reached maturity. Treatment will not mature peas.
 - Potato Vines - Spray at least two weeks before harvest. Spraying can be done by air or by a ground sprayer.
 - Alfalfa, Bird's-foot Trefoil, Red Clover and White Clover grown for seed - Apply no more than seven days prior to harvest by means of fixed-winged aircraft.
 - White, Red Kidney Beans, Soybeans, Adzuki Beans - Spray when 80-90% of natural leaf defoliation of the bean plants has occurred. Spraying can be done by air or by a ground sprayer. Treatment does not mature beans.

7. HOW TO APPLY:

With: Aircraft or ground equipment
Reglone can be applied to some crops by field sprayers but the booms must be set high enough to ensure proper coverage of the foliage being sprayed. It is more common though to have the application made with a fixed-wing aircraft.

Rate: Rapeseed, Mustard - In light stands of rapeseed and fields free from weeds, use 1.5 L in at least 20 litres of clean water per hectare. Heavy stands on fields which contain weeds, use 2.75 L in at least 20 litres of clean water per hectare. Add Agral 90 as a wetting and spreading agent at a rate of 1 L per 1000 litres spray mixture. **Do not** try to straight combine Argentine varieties of rapeseed. They must be swathed three days after application, or severe shelling and pod drop could occur should windy weather be experienced. Polish varieties may be straight combined.

Sunflowers - Apply Reglone at 1.5 L in 45 L of clean water per hectare. Add Agral 90 as a wetting and spreading agent at a rate of 1 L/1000 litres spray mixture.

Flaxseed - In light stands, or fields free from weeds, which are maturing evenly, apply Reglone at 1.5 L in at least 20 litres of clean water per hectare. In heavy or weedy stands, or fields with variation in growth, use 2.75 L in at least 20 litres of clean water per hectare. Higher volumes will generally give better results. Use Agral 90 at 1 L/1000 litres of spray mixture.

Field Peas and Dry Peas - In clean fields, apply Reglone at a rate of 1.5 L in at least 20 litres of clean water per hectare. If green weeds are present use 2.75 L in at least 20 litres of clean water per hectare. Use Agral 90 as a wetting and spreading agent at a rate of 1 L/1000 litres of spray mixture.

Alfalfa, Bird's-foot Trefoil, Red Clover and White Clover Grown for Seed - Use 2-3.25 L per hectare in 225-550 litres of clean water. Use Agral 90 at a rate of 1 L/1000 litres of spray mixture.

Red, White Kidney Beans, Soybeans, Adzuki Beans - Apply 2 L per hectare where the weed infestation is light to moderate. In moderate to heavy weed infestation, use 2.75 L per hectare. Use at least 300 litres of clean water per hectare. This treatment will not mature beans. Use Agral 90 as a wetting and spreading agent at a rate of 1 L/1000 litres of spray mixture.

Water Volume: Aircraft - minimum 20 L/ha
Ground - 250-1000 L/ha

Incorporation: Not applicable

Pressure: 275-400 kPa

Ground Speed: 9 km/h

Nozzles: All standard nozzles delivering the required volumes.

Protective

Equipment: Wear rubber gloves and goggles when handling the concentrate to prevent skin or eye contact. Do not breath spray mist or allow it to contact the eye. Wear an approved face mask and eye shield when required.

8. SPRAYING TIPS:

- Reglone can be applied easily in high or low volume sprayers which have been properly calibrated to deliver the correct number of litres of spray per hectare.
- Reglone applications made on cloudy days, during dull sunlight or just prior to or during periods of darkness will generally increase the subsequent effectiveness of the treatment.
- Use clean (non-turbid) water for spraying Reglone. Muddy water will reduce the effectiveness of Reglone.
- It is important to thoroughly wash equipment after spraying - use a wetting agent (Agral 90 at 60 mL per 100 litres of water), flush and spray out, then thoroughly rinse with clean water. When possible, the equipment should be filled with clean water and left overnight. Spray out before storing equipment or using for other materials.

9. HOW IT WORKS: Reglone is absorbed by all leaf and stem surfaces, but it does not move in the plant. Once inside the plant Reglone interferes with the photosynthetic process of the plant. This is followed by yellowing and eventual death of the plant.

10. EXPECTED RESULTS:

Weeds: Reglone provides immediate, fast and virtually complete top kill of maturing annual weeds. Usually yellowing will start to occur within a few hours of application. Desiccation of the plant will continue rapidly and eventual death will occur.

Crops: Usually leaf kill will occur within a few days of application. Stem fall will take longer depending on the crop, but in general harvesting should commence within 7-14 days of application.

Conditions under which poor results may be expected:

1. Insufficient water and rate for adequate coverage of the crop.
2. Application prior to the recommended stage.
3. Spray application during periods when climatic conditions are not favorable, (i.e. windy, temperature inversion, etc.)

11. EFFECTS OF RAINFALL: Once the spray solution has dried on the plant tissue, rain will not reduce the effectiveness of Reglone.

12. MOVEMENT IN THE SOIL: None

13. GRAZING AND CROPPING RESTRICTIONS:

Drift: Avoid application or drift onto crops, ornamental plants, lawns, grazing areas or other desirable growth.

Grazing Restrictions: None

Crop use after Hail: No restrictions

Succeeding Crops: No restrictions

14. TOXICITY:

Human: Prolonged direct contact with the spray mist may cause oral and nasal irritation, and should be avoided.

Fish and Wildlife: LD₅₀ Rats - 230 mg/kg

Bees: Not Applicable

15. SAFETY AND PRECAUTIONS:

First Aid: If swallowed induce vomiting. Get to nearest hospital **FAST. THIS IS ESSENTIAL.** If delay unavoidable, administer fluids and induce further vomiting. **If in eyes**, flush with clean water for 15 minutes and get medical attention. **If on skin**, wash thoroughly with water. Remove contaminated clothing immediately; wash before re-use.

For Physician: If swallowed give stomach wash-out and test urine and gastric aspirate for diquat. If positive, give up to 1 litre of adsorbent suspension (30% Fuller's Earth, activated charcoal or amberlite resin) mixed with a purgative (MgSO₄, NaSo or mannitol). Repeat administration of adsorbent suspension every 2 hrs for first 24 hrs and every 4 hrs for the next 24 hrs, plus purgatives as required. Maintain and monitor electrolyte and fluid status daily. Consider haemodialysis or haemoperfusion, using charcoal column. Delay oxygen as long as possible. **If in eyes** treat symptomatically, using antibiotics and steroids as necessary. Emergency telephone numbers 416/643-4123 8:30 a.m. - 4:45 p.m. After hours 416/528-6771 (state as calling for Chipman).

16. STORAGE: Reglone will crystalize if subjected to freezing temperatures. It, therefore, requires heated storage.

17. WHERE AVAILABLE: Reglone is available from almost all major grain companies and from many independent farm supply dealers.

Additional information available from:

Chipman Inc.
P.O. Box 965
Winnipeg, Manitoba
R3C 2V5
Phone: (204) 786-3421

RO-NEET (cylcoate)

1. FORMULATIONS: Emulsifiable concentrate 720 g/L
Available in 250 litre containers

2. REGISTERED MIXES: Ro-Neet 7.2 E - liquid fertilizer

Mix Restrictions: Compatibility test

Mixing with other Pesticides: Not recommended

3. CROPS: Red beets and spinach

4. WEEDS CONTROLLED:

Annual Grasses

Barnyard grass

Green foxtail

Yellow foxtail

Wild oats

Annual Broadleaf Weeds

Black nightshade

Henbit

Hairy nightshade

Lamb's-quarters

Purslane

Redroot pigweed

5. WEEDS SUPPRESSED: None

6. WHEN USED: Ro-Neet is only applied in the spring before planting.

7. HOW TO APPLY:

With: Ground equipment

Rate: Red Beets - Use 4.75 L/ha on light soils and 6.25 L/ha on heavier soils
Spinach - Use 4.75 L/ha on sandy soils only

Water Volume: 200-400 L/ha

Incorporation: Incorporation must be thorough for good weed control. Only two types of implements can provide satisfactory incorporation - these are:

1. Hooded power-driven rotary tiller, which is set to uniformly mix to a 5-7.5 cm depth.
2. Tandem or one way discs set to 10-15 cm. On heavy and medium soils cross discing (at right angles to the first) is required for adequate incorporation. On light soils, disc once followed by harrowing for additional mixing and to level the seed bed.

For maximum weed control sow the crop immediately after incorporation.

Pressure: 150-350 kPa

Ground Speed: 9 km/h

Nozzles: All standard and low pressure nozzles delivering approximately 200-400 L/ha.

Protective

Equipment: Standard protective equipment used when applying herbicides.

8. SPRAYING TIPS: Use a 200-400 L/ha high volume, low-pressure nozzle to ensure maximum uniform coverage.

9. HOW IT WORKS: Ro-Neet is taken in by the roots and shoots of a germinating weed. It disrupts and stops further growth which kills the germinating weed. Ro-Neet is not persistent in the soil, however it will provide effective weed control for approximately 6-8 weeks.

10. EXPECTED RESULTS:

Weeds: Ro-Neet controls a wide variety of weeds at the time when weed control is essential. Ro-Neet controls the weeds before they can compete for moisture and nutrients needed by the crop. Since Ro-Neet is absorbed by the weed shoot, most effected weeds will not emerge. Numerous chlorotic and bleached shoots may be visible by removing the top few inches of treated soil.

Crop: Applied according to directions and under normal growing conditions, Ro-Neet will not harm the treated crop. However, during germination and early stages of growth, unusually cold and wet or hot and dry weather, insect, nematode or plant disease attack, the use of certain soil-applied systemic insecticides, highly saline or alkaline soil conditions, improperly placed fertilizers or soil insecticides, may create abnormal conditions that weaken crop seedlings. Ro-Neet used under these conditions could result in crop injury.

Conditions under which poor results may be expected:

1. Conditions not suitable for application and incorporation (i.e. wet, cloddy soils).

11. EFFECTS OF RAINFALL: Ro-Neet is soluble in water and excessive moisture may leach Ro-Neet from the surface. This is not generally a problem.

12. MOVEMENT IN SOIL: Ro-Neet will move readily in the soil.

13. GRAZING AND CROPPING RESTRICTIONS:

Drift: Danger from drift is low
Grazing Restrictions: None
Crop use after Hail: No restrictions
Succeeding Crops: No restrictions

14. TOXICITY:

Fish and Wildlife: Oral LD₅₀ Rats - 3160 mg/kg
Bees: Not applicable

15. SAFETY AND PRECAUTIONS:

Ro-Neet EC May be harmful if swallowed. Avoid contact with skin, eyes and clothing. Wash with soap and water after use. Avoid breathing spray mist.

First Aid: Ingestion may produce symptoms. Absorption through skin or inhalation of quantities sufficient to produce poisoning is unlikely.

1. **Do not** induce vomiting.
2. Call physician.

For Physician:

1. **Do not** induce vomiting or lavage stomach. Aspiration pneumonia from solvent (kerosene) may complicate or overshadow carbamate poisoning.
2. Give symptomatic and supportive treatment. Consult your local Poison Control Center for additional information.

16. STORAGE: Ro-Neet 7.2E must be protected from temperatures below -6°C. At temperatures below this, the product will crystalize. Do not store Ro-Neet near any seed or fertilizers.

17. WHERE AVAILABLE: Ro-Neet can be purchased from almost all of the grain companies and from many independent farm supply dealers.

Additional information available from:

Chipman Inc.
P.O. Box 965
Winnipeg, Manitoba
R3C 2V5
Phone: (204) 786-3421

ROUNDUP (Glyphosate)

1. **FORMULATIONS:** Water soluble solution 356 g/L as isopropylamine salt.
Available in 1, 4 or 10 litre containers
 2. **REGISTERED MIXES:** Roundup + Torch
Roundup + Torch + non-ionic surfactant
Roundup + non-ionic surfactant
- Mixing Restrictions:** Clean water free of suspended clay, silt or organic matter must be used.
Mixing with other pesticides: Not recommended.
3. **CROPS:** This is a non-selective herbicide used for pre-plant, pre-emergence or for spot application in certain crops as indicated on the product label.
 4. **WEEDS CONTROLLED:** As labelled

Perennials

Bindweed (field)
 Bluegrass (Canada and Kentucky)
 Bromegrass (smooth)
 Canada thistle
 Cattail (common)
 Curled dock
 Hoary cress
 Indian hemp
 Milkweed (common)
 Poison-ivy
 Quackgrass
 Sow-thistle (perennial)
 Toadflax
 Wormwood

Annuals

Bluegrass (annual)
 Buckwheat (wild)
 Downy brome
 Green foxtail
 Japanese knotweed
 Kochia
 Lamb's-quarters
 Mustard (common)
 Prickly lettuce
 Ragweed (common)
 Redroot pigweed
 Russian thistle
 Shepherd's-purse
 Smartweeds (annual)
 Sow-thistle (annual)
 Wild oats
 Wild vetch

Deciduous brush species

Birch - *Betula* spp.
 Cherry - *Prunus* spp.
 Maple - *Acer* spp.
 Poplar - *Populus* spp.
 Raspberry - *Rubus* spp.
 Snowberry - *Symphoricarpos occidentalis*
 Willow - *Salix* spp.

5. **WEEDS SUPPRESSED:** Many
6. **WHEN USED:** Canada thistle and quackgrass must be a minimum of 20-25 cm in height and up to the early heading stage or early bud stage of growth. All other perennials must have reached the early head or early bud stage of growth at treatment time. Annual weeds are controlled with the lower labelled rate when 15 cm or less in height. Apply to deciduous brush when actively growing from June through August.

7. HOW TO APPLY:

With: Ground equipment only.
Rate: Perennial weeds - 4.75 to 12 L/ha
 Annual weeds - 2.25 to 3.5 L/ha
 Brush species - 10 L/ha
 Minimum or zero tillage systems - 1.1 to 1.4 L/ha
Water Volume: Handgun and high volume equipment - use coarse sprays only at 200-300 L/ha.
 Boom equipment - 100-300 L/ha
Incorporation: Not applicable
Pressure: 275 kPa
Ground speed: 9 km/h
Nozzles: All fan type nozzles except floodjet delivering 100-300 L/ha
Protective Equipment: To avoid contact with skin or eyes, wear rubber gloves and goggles when handling or spraying.

8. SPRAYING TIPS:

9. **HOW IT WORKS:** Roundup is a systemic herbicide which moves through the plant from the point of foliage contact to and into the root system.

10. **EXPECTED RESULTS:** Visible effects on most annual weeds occur within 2 to 4 days but on most perennial weeds may not occur for 7 to 10 days. Visible effects are a gradual wilting and yellowing of the plant which advances to complete browning of above ground growth and deterioration of underground plant parts. Extremely cool or cloudy weather at treatment time may slow down activity of this product and delay visual effects.

Conditions under which less than satisfactory results may be expected:

- Rainfall within 6 hours after application
- Inadequate spray coverage of target species
- Too early application on perennial species
- Using an unsatisfactory water supply which contains suspended silt, clay and organic matter
- Extreme plant stress due to drought and high temperatures at treatment time
- Disturbance of a perennial's root system due to cultivation prior to treatment.

11. **EFFECTS OF RAINFALL:** Rainfall occurring within 6 hours after application may reduce effectiveness. Heavy rainfall within 2 hours after application may wash the chemical off the foliage and a repeat treatment may be required.

12. **MOVEMENT IN SOIL:** Not applicable.

13. **GRAZING AND CROPPING RESTRICTIONS:**

Drift: Do not allow spray mist to drift since even minute quantities of spray can cause severe damage or destruction of nearby crops, plants or other areas on which treatment is not intended. Do not apply when winds are gusty or in excess of 8 km/h or when other conditions, including lesser wind velocities, will allow drift to occur. When spraying, avoid combinations of pressure and nozzle type that will result in fine particles (mist) which are more likely to drift.

Grazing Restrictions: Do not graze or harvest treated areas in forages until treated plants have turned brown and started to deteriorate.

Crop use after hail: Do not graze or harvest treated areas in forages until treated plants have turned brown and started to deteriorate.

Succeeding crops: No restrictions.

14. **TOXICITY:** For glyphosate

Acute oral LD₅₀ for rats - 4320 mg/kg

Skin absorption MLD for rabbits is - greater than 7940 mg/kg

Skin irritation to rabbits - non-irritating

Honeybees, mallard ducks and rainbow trout have an extremely high tolerance to glyphosate

15. **SAFETY AND PRECAUTIONS:** Spray solutions of this product should be mixed, stored and applied only in stainless steel, aluminum, fiberglass, plastic and plastic-lined steel containers. This product or spray solutions of this product react with galvanized steel or unlined steel (except stainless steel) containers or spray tanks to produce hydrogen gas which may form a highly combustible gas mixture. This gas mixture could flash or explode, causing serious personal injury. This chemical may cause eye irritation, and is harmful if swallowed.

First Aid: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician. Flush skin with water.

16. **STORAGE:** Store above -12°C to keep from freezing, freezing will result in crystals which settle to the bottom of the container. If allowed to freeze, place in a warm room 22°C and roll and shake the container frequently for several days.

17. **WHERE AVAILABLE:** Alberta Wheat Pool, Cargill Grain, Green Cross, United Grain Growers, Pfizer Chemicals, Federated Cooperatives Ltd., Pioneer Grain Co. Ltd.

Additional information available from:

Monsanto Canada Inc.
#23, 1313 Border Street
Winnipeg, Manitoba
R3H 0X4
Phone: (204) 632-1278

In case of an emergency involving a Monsanto herbicide call the following number collect at any time, phone 1-(314) 694-1000.

SENCOR (metribuzin)

1. **FORMULATIONS:** 500 flowable 500 ml active/litre
Available in 4 litre jugs, 4 jugs/case

750 water dispersable granule (sprayule)
750 g active/kg
Available in 1.5 kg bags, 12 bags/case
 2. **REGISTERED MIXES** Sencor + MCPA amine - Cereals
Sencor + Banvel - Cereals
Sencor + 2,4-D amine - Cereals
Sencor + Eptam - Potatoes
Sencor + Treflan - Fababeans
 3. **CROPS:** Spring wheat and barley (except Klondike), potatoes, lentils, fababeans
- Underseeding:** Do not underseed.
4. **WEEDS CONTROLLED:** Buckwheat (Tartary), chickweed, corn spurry, hemp-nettle, lamb's quarters, mustard (ball and wild), smartweeds (annual), stinkweed, volunteer rape. Wild buckwheat with the Banvel mix and those controlled with 2,4-D or MCPA in those mixes. (see chart for specific weeds).
Note: Stinkweed, volunteer rapeseed and wild mustard are controlled at the 0.275 L/ha rate.
 5. **WEEDS SUPPRESSED:** Canada thistle and sow-thistle with the 2,4-D, MCPA and Banvel mixes.
 6. **WHEN USED:**

Wheat and Barley - Sencor alone - 2-5 leaf stage
Sencor + MCPA amine - 3-5 leaf stage
Sencor + 2,4-D amine - 3-5 leaf stage
Sencor + Banvel - 2-3 leaf stage of barley, 2-4 leaf stage of wheat
Potatoes - Sencor alone - Apply before weeds are 4 cm high
Sencor + Eptam - Apply pre-plant incorporated
Fababeans - Sencor + Treflan - Apply pre-plant incorporated
Lentils - Sencor alone - Apply when lentil vines are 7.5-15 cm long and after weeds have emerged.

7. HOW TO APPLY:

With: Ground equipment (preferably)
Rate: Barley - 0.275-0.55 L/ha of 500 Flowable alone or tank-mixed with 0.85-1.1 L/ha of MCPA or 2,4-D amine 500 or tank-mixed with 0.275 L/ha of Banvel 400.
Wheat - 0.275-0.425 L/ha of 500 Flowable alone or tank mixed with 0.85-1.1 L/ha of MCPA or 2,4-D amine 500 or tank-mixed with 0.275 L/ha of Banvel 400.
Lentils - 0.425 L of 500 Flowable applied as a post-emergence broadcast spray.

Potatoes
- 0.55 L of 500 Flowable applied early post-emergence
- under irrigation, 0.55-2.25 L/ha (maximum) applied early post-emergence
- irrigation or dryland, 0.55-0.85 L/ha (maximum) of 500 Flowable tank-mixed with 4.25-5.5 L/ha of Eptam 800 as a pre-plant incorporated treatment.

Fababeans
Spring Application - 0.55-0.85 L/ha of 500 Flowable tank-mixed with 2-2.75 L/ha of Treflan 400 EC as a pre-plant incorporated treatment.
Fall Application - 0.85 L/ha of 500 Flowable tank-mixed with 2.75-3.5 L/ha of Treflan 400 EC as a pre-plant incorporated treatment.

Water Volume: 100 L/ha
Incorporation: For Sencor + Eptam on potatoes refer to Eptam section. For Sencor + Treflan on fababeans refer to Treflan section.
Pressure: 20-275 kPa
Ground Speed: 9 km/h
Nozzles: All standard or low pressure nozzles delivering 100 L/ha
Protective Equipment: Standard protective equipment used when applying herbicides.

8. SPRAYING TIPS:

- Allow a 4-5 day interval between the application of Sencor and post-emergent wild oat herbicides.
- Weed control may be reduced if Sencor is applied later than the 5 leaf stage of crop.
- If frost occurs allow 4-5 days for crop to recover before applying Sencor.
- Crop may be sprayed when it is wet with dew.
- Lentils - do not apply more than once per crop season. Crop must be planted at least 5 cm below the soil surface.

9. **HOW IT WORKS:** Sencor is a systemic herbicide which enters the plant through the leaf and to some extent through the roots. It is translocated upward and gathers in the leaves, especially the new growth. The site of action is the chloroplast where it acts to block photosynthesis. The eventual result is that the weed turns brown and dies.
10. **EXPECTED RESULTS:**
- Broadleaf Weeds:** The weeds show yellowing at about 5-7 days after application. The yellowing will turn to browning and the weeds will eventually die. All weeds should be dead within 14-16 days after application. Shallow-rooted broadleaf weeds, like chickweed and corn spurry may germinate after spraying and thus be missed by spray. However, the spray that misses the foliage of weeds and crops is washed into the soil where it is active for a relatively short period of time. The new germinating chickweed will be killed through root uptake of Sencor.
- Crop:** Under certain environmental conditions, such as extremely hot weather or frost that occurs within 1-2 days of application, the crop will show some yellowing and slight reduction in height. The discolouration will not be visible within 7-10 days.
11. **EFFECTS OF RAINFALL:** Rainfall within 6 hours after application may reduce weed control.
12. **MOVEMENT IN SOIL:** Sencor is quite soluble in water and therefore is quite mobile, however, it is bound by organic matter and clay. Net lateral movement is limited.
13. **GRAZING AND CROPPING RESTRICTIONS:**
- Do not graze or feed treated crop to livestock within 30 days of application (lentils - 70 days)
 - Do not harvest for grain within 60 days of application (lentils - 70 days)
14. **TOXICITY:** Rat acute oral LD₅₀ - Male - 1090 mg/kg
- Female - 1206 mg/kg
15. **SAFETY AND PRECAUTIONS:** May be harmful if swallowed or inhaled. Avoid contact with eyes, skin or clothing. Avoid breathing of spray mist. Wash thoroughly with soap and warm water after handling.
- Toxicological Information (for physician):** The exact toxic mode of action of Sencor is not known. In experimental animals acutely poisoned with Sencor, no characteristic symptoms were noted other than sedation. The patient should be treated symptomatically.
- First Aid:** In case of poisoning call a physician immediately. If swallowed, vomiting should be induced. Administer milk or water freely and induce vomiting by giving one dose (amount - 15 mL) of syrup of ipecac. If vomiting does not occur within 10 to 20 minutes, administer second dose. If syrup of ipecac is not available, induce vomiting by sticking finger down throat. Repeat until vomit fluid is clear. The patient should be lying down with the head below the foot level and facing down or to one side. Professional medical assistance should be secured immediately. **DO NOT INDUCE VOMITING TO AN UNCONSCIOUS PERSON OR TO PERSONS IN A CONVULSIVE STATE.** If on skin, remove contaminated clothing and wash skin immediately with soap and warm water. If eyes are contaminated, wash immediately with flowing water for at least 15 minutes.
16. **STORAGE:** Neither formulation of Sencor is damaged by freezing. Store in a cool dry place and avoid large temperature fluctuations over the period of storage.
17. **WHERE AVAILABLE:** Sencor is available from Alberta Wheat Pool, United Grain Growers, Pioneer Grain, Green Cross Products, Oliver Industrial Supply, Pfizer Chemicals.

Additional information available from:

Chemagro Ltd.
1355 Aerowood Drive
Mississauga, Ontario
L4W 1C2
Phone: (403) 259-2863

Chemagro Ltd.
#203, 610 - 70 Avenue S.E.
Calgary, Alberta
T2H 2J6

SINBAR (terbacil)

1. **FORMULATION:** Sinbar 80% W.P. (available in 2 kg bags)
2. **REGISTERED MIXES:** None
3. **CROPS:** Alfalfa - after crop has been established for 1 growing season
- registered for use in forage and seed alfalfa
Nurse crop: not recommended
4. **WEEDS CONTROLLED:** Annual bluegrass, downy brome, green foxtail, mustard, perennial ryegrass, prickly lettuce, shepherd's purse, stinkweed and sow-thistle (annual)
5. **WEEDS SUPPRESSED:**

Dandelion (less than 2 years old) quackgrass.
Weeds not controlled - Canada thistle (perennial)
- Field bindweed
- Perennial sow-thistle
6. **WHEN USED:** Apply after alfalfa goes dormant in the fall or before new growth begins in the spring. A fall application is preferred.
7. **HOW TO APPLY:**

With: Ground equipment
Rate: 0.7-1.5 kg/ha. Use the lower rate on lighter soils and the higher rate on heavier soils. Do not use on soils containing less than 1% organic matter as injury may result. (one 2 kg bag treats 2.8 ha at the 0.7 kg rate).
Water Volume: 200 L/ha
Incorporation: None required. However moisture in the form of rainfall or irrigation is required to activate the chemical.
Pressure: 275 kPa
Ground Speed: 9 km/h
Nozzles: All standard nozzles delivering approximately 200 L/ha. Stainless steel nozzles are preferred.
Protective Equipment: Standard protective equipment used when applying herbicides.
8. **SPRAYING TIPS:**
 - Use 50 mesh line stainers and screens
 - Continuous agitation is required
 - Do not plant areas to any crop within 2 years after last treatment.
9. **HOW IT WORKS:** Sinbar must be moved into the root zone of weeds with moisture. Sinbar is absorbed by the root system of the plant. Once in the plant, its mode of action is to strongly inhibit photosynthesis.
10. **EXPECTED RESULTS:**

Weeds: Once Sinbar is in the soil it kills weeds as they germinate. Emerged weeds will start to yellow and die. Total effect is dependent on soil type, amount of moisture, and species to be controlled.

Crop: No effect should be seen if applied when alfalfa is dormant.

Conditions under which poor results may be expected:
 1. too little moisture for activation
 2. uneven coverage
 3. rate too low for soil type.
11. **EFFECTS OF RAINFALL:** Rainfall after application is desirable.
12. **MOVEMENT IN SOIL:** Under certain soil and moisture conditions some movement within the soil may be expected.
13. **GRAZING AND CROPPING RESTRICTIONS:**

Drift: Most crops are sensitive to Sinbar.
Grazing Restrictions: None.
Succeeding crops: Do not plant treated area to any crop within 2 years of last treatment.
14. **TOXICITY:** Fish & Wildlife - Rats LD₅₀ - 5000-7000 mg/kg
Bees: Non toxic

15. SAFETY AND PRECAUTIONS: May irritate eyes, nose, throat and skin. Avoid breathing dust or spray mist. Avoid contact with skin, eyes and clothing. Wash thoroughly with soap and water after handling.
16. STORAGE: Store in a cool dry place.
17. AVAILABLE FROM: Alberta Wheat Pool, Niagara, Oliver Industrial Supply, United Grain Growers, Pfizer, Federated Co-op

Additional information available from:

DuPont Canada Inc.
Suite 300 Center 70
7015 MacLeod Trail S.
P.O. Box 5848 Station A
Calgary, Alberta
T2H 2K6
Phone: (403) 259-4640

SODIUM TCA

1. **FORMULATION:** Granular formulation containing 85% TCA acid equivalent as sodium salt, solution formulation containing 415 g/L acid equivalent present as sodium salt.
Available in 25 kg bags and 20 litre pails
2. **REGISTERED MIXES:** Sodium TCA + MCPA Amine or MCPA Sodium Salt
Sodium TCA + 2,4-D Amine
Sodium TCA + MCPB Amine
Sodium TCA + Mecoprop (Potassium Salt)

If 2,4-D or MCPA is used, add TCA to tank first.

3. **CROPS:** Barley, oats, rapeseed, flax, field peas.
4. **WEEDS CONTROLLED:** Green and yellow foxtail, barnyard grass.
5. **WEEDS SUPPRESSED:** Quackgrass.
6. **WHEN USED:**

Oats and Barley - apply when weeds are in the 1-3 leaf stage and the crop is in the 2-4 leaf stage. Oats and barley should be seeded 5 cm deep or deeper to reduce chances of crop injury.

Field Peas - Apply when crop is 10-20 cm tall and foxtail is in the 1-3 leaf stage.

Rapeseed and Flax - Apply when rapeseed is in the 2-4 leaf stage; flax should be 10-15 cm in height. Should be applied before weeds have 4 true leaves.

7. HOW TO APPLY:

- With:** Ground equipment.
Rate: (use the lower rate on light, sandy soil)
Oats - for green foxtail, apply at 1.34 - 2.68 kg/ha (granular), 1.75-3.55 L/ha (solution)
Barley - for green foxtail, apply at 1.34 kg/h (granular), 1.75 L/ha (solution)
Field Peas - for annual grass control, apply at 4.48 kg/ha
Flax and Rapeseed - annual grass control, apply at 4.48 kg/ha (granular), 5.5-9.0 L/ha (solution)
Nonselective Treatment - apply NaTA (TCA) for the control of established stands of quackgrass at 112 kg/ha. For control of patches, apply NaTA in the fall at 100 grams to 130 grams per 10 square metres on undisturbed soil and 70 grams to 85 grams per 10 square metres when combined with a thorough cultivation such as that given by a plain or one-way disc.
Solution - 100-200 L/ha undisturbed grasses. 50-100 L/ha when cultivation preceeds application.
Suppression of Grasses: 4.5 - 6.8 kg (granular) will cause established grasses to be stunted and prevent seed production. Apply 11-25 L/ha (solution) before heading. Can be used to control green foxtail.
- At 1.34 kg/ha rate, one 25 kg bag will treat 18.6 ha, at 1.75 L/ha rate, one 20 litre container will treat 11.4 ha)
- Water Volume:** Barley and Oats: 100 L/ha (granular), 100-150 L/ha (solution)
Rapeseed and Flax: 100-150 L/ha (granular and solution)
Field Peas: 100 L/ha (granular and solution)
- Incorporation:** Only applicable in spot treatment for quackgrass.
Pressure: 275 kPa
Ground Speed: 9 km/h
Nozzles: No screens smaller than 50 mesh, flat fan type nozzles.
Protective Equipment: Standard protective equipment used when applying herbicides.

8. SPRAYING TIPS:

- Flush sprayer thoroughly after each use.
- Adequate agitation needed during mixing to completely dissolve TCA. Pre-dissolve TCA in a small amount of warm water to ensure quick and complete mixing.
- Use 50 mesh screens and filters. Stainless steel and hardened stainless steel nozzle types are recommended.

9. **MODE OF ACTION:** TCA is absorbed more through the roots than by the foliage. It precipitates proteins within the plant, which are essential for growth.

10. EXPECTED RESULTS:

Lightening of green coloration is the first noticeable effect of TCA on green foxtail. Browning of the leaf tips, growth retardation and eventual death of the grass follows.

Effects on the crops are similar to those present on the green foxtail if higher rates are used. In addition, on crops such as barley, increased tillering can result.

Conditions under which poor results may be expected:

1. Dry soil conditions.

11. EFFECTS OF RAINFALL: A light rainfall on newly treated soil is beneficial.

12. MOVEMENT IN SOIL: TCA acts mainly through the soil so activity will be greatest on sandy soil and under good moisture conditions.

13. GRAZING AND CROPPING RESTRICTION: Do not graze treated areas for at least 24 hours after treatment.

14. TOXICITY: Rats acute oral LD₅₀ ~ 5000 mg/kg

15. SAFETY AND PRECAUTIONS: Sodium TCA is a poisonous product which can cause irritation to both skin and eyes and may cause burning on prolonged contact. Remove contaminated clothing and wash before reuse.

First Aid: In case of contact, flush skin or eyes with plenty of water for at least 15 minutes. For eyes, get medical attention. If taken internally, administer by mouth a neutralizer and diluent such as magnesium oxide, lime water, amphogel, or soap solution. Opiate for control of pain. Keep patient warm. Contact physician.

16. STORAGE: Keep in dry storage. Frost does not affect NaTA.

17. AVAILABILITY: Federated Co-operatives, Niagara Chemicals, Pfizers, Alberta Wheat Pool, Oliver Chemicals, Pioneer Grain and United Grain Growers.

Additional information available from:

Hoechst Canada Inc.
645 Park Street
Regina, Saskatchewan
S4N 5N1
Phone: (306) 545-8166

Pfizer, Agricultural Chemicals Division
2140 Notre Dame Avenue
Winnipeg, Manitoba
R3H 0K1
Phone: (204) 632-5126

SPIKE (Tebuthiuron)

1. **FORMULATIONS:** 80% wettable powder
Available as a 20 kg box and 2 kg bag

5% granular (Spike 5G)
Available as a 7 kg shaker box or 20 kg drum
2. **REGISTERED MIXES:** None

Mix Restrictions: Not applicable.
Mixing with Other Pesticides: Not recommended.
3. **CROPS:** Non-crop land only.
4. **WEEDS CONTROLLED:** Spike is non-selective. Controls both annual and perennial weeds.

Weeds controlled include: Bladder campion, Canada thistle, common milkweed, field horsetail, foxtail barley, kochia, lamb's-quarters, nodding thistle, perennial sow-thistle, redroot pigweed, Russian thistle, smartweeds, spotted knapweed, stinkweed, tall buttercup, toadflax, western snowberry (buckbrush).
5. **WEEDS SUPPRESSED:** Not applicable.
6. **WHEN USED:** Spike can be used throughout the growing season and up to September 15th. Best results will be obtained if applied shortly before or at the time plant growth begins.
7. **HOW TO APPLY:**

A) Spike 5G

With:	A Spike 5G shaker box or granular spreader.
Rate:	110 kg/ha to 225 kg/ha (Spike 5G). Apply the higher rates for difficult to control weeds. Greater residual effect can be expected when higher rates are used.
Water Volume:	Not applicable
Incorporation:	Not applicable
Pressure:	Not applicable
Ground Speed:	Not applicable
Nozzles:	Not applicable
Protective Equipment:	Standard protective equipment used when applying herbicides.

B) Spike 80WP

With:	Ground spray equipment.
Rate:	5.5 to 11 kg/ha. Apply the highest rate for very difficult to control weeds, and on areas where longer term weed control is desired.
Water Volume:	250-450 L/ha
Incorporation:	Not applicable
Pressure:	140-300 kPa
Ground Speed:	Not specified
Nozzles:	Standard nozzles delivering a minimum of 250 L/ha.
Protective Equipment:	Standard protective equipment used when applying herbicides.

8. **SPRAYING TIPS:**
 - a) do not apply on areas where bare ground is undesirable.
 - b) do not apply where soil erosion may be a problem.
 - c) do not apply Spike within 1½ times the height of any desirable trees.
 - d) do not use on walks, driveways, lawns, patios, tennis courts or similar areas where the roots of desirable trees may extend.
 - e) when using Spike 80WP keep the chemical suspended at all times by constant agitation.
 - f) if bypass agitation is used the return line should terminate at the bottom of the tank to minimize foaming.
 - g) clean all traces of Spike from application equipment after use. Remove nozzle tips and screens and rinse thoroughly. Flush the tank, pump, hoses and boom with several changes of water.
9. **HOW IT WORKS:**

Spike 80WP and 5G are surface applied and depend upon rainfall to move them into the soil. Spike must be taken up by the weed roots to be effective and it kills the weed by inhibiting photosynthesis. The plants turn yellow and then die. Because Spike must be carried downward into the soil by moisture, the speed of kill depends upon how deeply rooted the target weed is and the amount of rainfall. The initial kill given by Spike is slow but once the product is established in the soil, it will provide extremely effective and long term weed control.

10. EXPECTED RESULTS:

Vegetation present on the treated area will turn brown and die. A complete kill of vegetation would be expected after one growing season. No new growth will appear for several years resulting in bare ground. Duration of control will depend upon amount of chemical applied, soil-type and environmental conditions.

Conditions under which poor results may be expected:

- a) Inadequate application rate.
- b) Application onto frozen ground.
- c) Application on areas subject to severe soil erosion.

11. EFFECT OF RAINFALL: Rainfall will activate the Spike by carrying it into the root zone.

12. MOVEMENT IN THE SOIL: Once moved into the soil by rainfall, Spike will leach vertically with time. Spike will not move laterally once it is in the soil.

13. GRAZING AND CROPPING RESTRICTIONS:

Drift: Not applicable

Grazing Restrictions: Not applicable

Crop use after Hail: Not applicable

Succeeding Crops: Spike is a non-selective residual herbicide. It should only be used on non-cropland where bare ground is desired.

14. TOXICITY: Bees: Not applicable.

15. SAFETY AND PRECAUTIONS:

Spike 80WP: Harmful if swallowed.

First Aid: If ingested, induce vomiting and call a physician. Avoid contact with skin and eyes. If contacted, wash skin with soap and water, and flush eyes with large amounts of water. Avoid breathing dust or spray mist.

Spike 5G: Harmful if swallowed. Avoid breathing dust. Avoid contact with skin, eyes or clothing.

First Aid: In case of contact, wash skin with soap and water, and flush eyes with large amounts of water.

16. STORAGE: Store in a dry place.

17. WHERE AVAILABLE:

80WP - Molsberry, Division of Reichhold Chemical, Van Waters and Rogers, Able Industries.

5G - Molsberry, Division of Reichhold Chemical, Van Waters and Rogers, Able Industries, Alberta Wheat Pool, Cargill Grain, Pioneer, Chipman Chemicals, Federated Cooperatives.

Additional information available from:

Elanco Products Division
Eli Lilly and Company (Canada) Ltd.
Unit #3, 9829 - 44 Avenue
Edmonton, Alberta
T6E 5E6
Phone: (403) 436-7145

STAMPEDE (propanil)

1. FORMULATIONS: Emulsifiable concentrate; 240 g/L (Available in 22.7 litre container)
2. REGISTERED MIXES: None

Mixing Procedures and Restrictions: Fill spray tank half full of water. Add measured amount of Stampede. Engage agitator and continue filling with water to the required total volume. Agitate at least 5 minutes immediately before spraying. Water used should be 10°C or warmer. Spray Stampede within 6 hours of mixing. Drain and flush sprayer tank and lines at end of each day's spraying.

Mixing with other Pesticides: Do not tank mix Stampede with any herbicide, insecticide, spray adjuvant, or fertilizer solution. A 3 day interval should be allowed before or after an application of Stampede and another herbicide. If an insecticide treatment is required, use Furadan, waiting a minimum of 5 days after Stampede application in wheat and 10 days in barley. Dimethoate (Cygon TM) or Malathion may also be used, but allow a minimum interval of 14 days following a Stampede application. Crops grown from seed treated with dual purpose (fungicide/insecticide) seed dressings may be treated with Stampede. Do not apply Stampede in fields to which Atrazine has been applied during the previous two years.

3. CROPS: All varieties of barley, spring wheat, oats and flax.

Underseeding: Not recommended.

4. WEEDS CONTROLLED: Buckwheat (tartary and wild), foxtail (green and yellow), lamb's-quarters, redroot pigweed, smart-weeds (annual) at the 1-4 leaf stage; bluebur, flixweed, kochia, volunteer rapeseed, wild mustard at the seedling stage; shepherd's-purse and stinkweed at the seedling or rosette stage.
5. WEEDS SUPPRESSED: None
6. WHEN APPLIED: Under normal conditions apply when the majority of green foxtail are in the 3-leaf stage and less than 2.5 cm in height. When soil moisture is deeper than 5 cm apply when green foxtail is in the 2-3 leaf stage. Cereal crops must be in the 2-5 leaf stage and flax must be no more than 10 cm tall in height at time of application. Application should be made within 17 days of crop emergence (21 days after seeding). Do not spray when temperature exceeds 30°C.
7. HOW TO APPLY:

With:	Ground equipment: low pressure field sprayers and large commercial floater-type equipment.
Rate:	4.25 L/ha (22.7 litre pail treats 5.3 ha)
Water Volume:	Regular low pressure field sprayers - 100 L/ha Floater type equipment - 150 L/ha
Incorporation:	Not applicable
Pressure:	275 kPa
Ground Speed:	9 km/h for field sprayers, 20 km/h or less for floaters
Nozzles:	Only flat fan nozzles capable of delivering 100 L/ha are recommended for use with regular spray equipment. Low pressure nozzles used according to manufacturer's specifications for applying post-emergence pesticides have proven satisfactory in all preliminary tests. All other nozzles are not recommended for use.
Protective Equipment:	Eye and skin irritant. Wear protective goggles and gloves when handling concentrate.

8. SPRAYING TIPS:

- If weather has been hot and dry and relative humidity low, spraying should be restricted to early morning or evening. Do not apply Stampede when daily maximum temperatures are not expected to exceed 10°C.
- Correct spray timing is essential for satisfactory results. Follow all recommendations for timing under various conditions.
- Thorough spray coverage is necessary for effective weed control.
- 80° nozzles are more efficient than 65° nozzles.
- Follow restrictions concerning applications of other herbicides as well as insecticides.
- Do not apply if crop is under severe stress or if frost is expected within 24 hours after application.

9. HOW IT WORKS: Stampede rapidly enters the foliar portion of plants, causing breakdown of cell walls as well as interference with the cellular metabolism of susceptible weed species. Activity is primarily contact, therefore thorough spray coverage is necessary for optimum weed control. Also, susceptible weeds tend to become tolerant as they mature past the 4 leaf stage. Stress conditions will trigger a hardening off process and hasten the development of tolerance to chemical control.

10. EXPECTED RESULTS:

Green foxtail and broadleaf weeds: Affected weeds turn brown in 3-5 days and have a "burnt-off", or dessicated appearance. Weeds past the recommended stage will show extensive browning, but some degree of green, photosynthesizing tissue remains. New tissue is produced, and the weed will recover. Weeds emerging after spraying are unaffected.

Crops: Temporary yellowing, paling and leaf tip burn is usually noticed, generally more pronounced in oats and barley than in wheat. (Flax shares the same general symptoms). The effects normally disappear 10-14 days after treatment. All new growth develops normally and yields are not reduced. Resultant weed control may keep the crop green and growing longer. Under stress conditions, a slight delay in crop maturity may be noticed. Frost within 24 hours after a Stampede application, or treatment after the 5 leaf stage of cereals may cause long term crop injury.

Conditions under which poor results may be expected:

1. Applications made later than recommended.
2. Inadequate spray coverage due to low water volumes, faulty equipment or interception of spray by a mature, dense crop and weed canopy.
3. Stress conditions result in the earlier development of weed resistance and an increased potential for crop injury.

11. EFFECTS OF RAINFALL: More than 1 hour after application will not affect performance.

12. MOVEMENT IN SOIL: Not applicable.

13. GRAZING AND CROPPING RESTRICTIONS:

Drift: Danger is low, but do avoid drift to broadleaf crops, vegetables and ornamentals.

Grazing Restrictions: None on label.

Crop Use after Hail: No restrictions.

Succeeding Crops: No restrictions.

14. TOXICOLOGY: The oral LD₅₀ in rats for Stampede technical is 560 mg/kg. Toxicity of formulated product is lower than the technical component on a unit dose basis.

15. SAFETY AND PRECAUTIONS: Can cause giddiness, intoxication and headache due to solvent. Prolonged exposure can cause skin irritation. Avoid breathing the spray mist and avoid swallowing.

First Aid: In case of contact with skin, wash thoroughly with soap. In case of contact with eyes, flush with water for at least 15 minutes and get medical attention. If taken internally, induce vomiting by inserting finger in throat, then drink plenty of water. Get medical attention immediately.

16. STORAGE: Heated storage not required. If material is stored below -18°C it is advisable to hold in a warm place and agitate pails. Any crystal formulation will redissolve, and activity remains unaffected.

17. WHERE AVAILABLE: Alberta Wheat Pool, Cargill Grain, Federated Cooperatives Ltd., Pfizer Chemicals, Pioneer Grain and United Grain Growers.

Additional information available from:

Rohm and Haas Canada Inc.
Prairies Regional Office
Suite #14, 83 King Edward Street
Winnipeg, Manitoba
R3H 0P5
Phone: (204) 774-1755

STAMPEDE CM (propanil plus MCPA)

1. FORMULATIONS: Emulsifiable concentrate: 460 g/L
(360 g/L propanil plus 100 g/L low volatile MCPA ester)
Available in 20 litre containers.
2. REGISTERED MIXES: None

Mixing Procedures and Restrictions: Fill spray tank half full of water. Add Stampede CM, engage agitator and continue filling. Agitate at least 5 minutes immediately before spraying. Water used should be 10°C or warmer. Spray Stampede CM within 6 hours of mixing. Drain and flush sprayer tank and lines at the end of each day's spraying.

Mixing with other Pesticides: Do not tank mix Stampede CM with any herbicide, insecticide, spray adjuvant, or fertilizer solution. A 3 day interval should be allowed before or after an application of Stampede CM and another herbicide. If an insecticide treatment is required, use Furadan, waiting a minimum of 5 days after Stampede CM application in wheat and 10 days in barley. Dimethoate (Cygon TM) or Malathion may also be used, but allow a minimum interval of 14 days following a Stampede CM application. Do not apply Stampede CM in fields to which Atrazine has been applied during the previous two years. Crops grown from seed treated with dual purpose (fungicide/insecticide) seed dressings may be treated with Stampede CM.

3. CROPS: All varieties of barley and spring seeded wheat (including durum), flax and oats.

Underseeding: Not recommended.

4. WEEDS CONTROLLED: Buckwheat (tartary and wild), foxtail (green and yellow), lamb's-quarters, redroot pigweed, smart-weeds (annual) at the 1-4 leaf stage; bluebur, flixweed, kochia, volunteer rapeseed, wild mustard at the seedling stage; shepherd's-purse and stinkweed at the seedling or rosette stage.
5. WEEDS SUPPRESSED: None
6. WHEN APPLIED: Under normal conditions apply at the 3 leaf and no later than the 4 leaf stage of green foxtail (plants less than 2.5 cm in height). When soil moisture is deeper than 5 cm, apply when green foxtail is at the 2-3 leaf stage. Susceptible broadleaf weeds are expected to be controlled at this time.

Cereal crops must be at the 2-5 leaf stage and flax must be between 5 and 12 cm in height at time of application. Application on flax should be made within 17 days of crop emergence (21 days after seeding). Do not spray flax when temperatures exceed 30°C.

7. HOW TO APPLY:

With:	Ground Equipment: low pressure field sprayers and large commercial floater-type equipment.
Rate:	2.75 L/ha. One 20 litre pail treats 7.3 ha.
Water Volume:	Regular low pressure sprayers - 100 L/ha Floater type equipment - 150 L/ha
Incorporation:	Not applicable
Pressure:	275 kPa
Ground Speed:	9 km/h field sprayers 20 km/h or less for floaters
Nozzles:	Only flat fan nozzles capable of delivering 100 L/ha are recommended with regular spray equipment. Low pressure (LP) nozzles have proven satisfactory in preliminary tests. All other nozzles are not recommended.
Protective Equipment:	Eye and skin irritant. Wear protective goggles and gloves when handling concentrate.

8. SPRAYING TIPS:

- Correct spray timing is essential
- Thorough spray coverage is necessary for effective weed control.
- 80° nozzles are more efficient than 65° nozzles.
- Follow restrictions concerning applications of other herbicides as well as insecticides.
- Do not apply if crop is under severe stress or if frost is expected within 24 hours.
- If weather has been hot and dry and relative humidity low, spraying should be restricted to early morning or evening.
- Do not apply Stampede CM when daily maximum temperatures are not expected to exceed 10°C.

9. HOW IT WORKS:

Rapidly absorbed by foliage. Stampede CM causes breakdown of cell walls as well as interference with the cellular metabolism of susceptible weed species. The MCPA component causes phenoxy - specific symptoms. Activity is essentially contact, and thorough spray coverage is necessary for optimum weed control. Spraying as recommended ensures complete coverage before tall, dense weed/crop growth results in a canopy effect which screens the weeds from the spray and leads to poor weed control. Also, susceptible weeds become tolerant as they mature past the 4 leaf stage. Stress conditions cause a hardening off process and hasten the development of tolerance to chemical control.

10. **EXPECTED RESULTS:** Green foxtail and broadleaf weeds: Within 3-5 days affected weeds turn brown and have a "burnt off" or dessicated appearance. Weeds past the recommended stage will show extensive dessication, but some portion of green, photosynthesizing tissue remains. New plant growth may be generated, and the weed will recover. Weeds emerging after spraying are unaffected.

Crops: Temporary yellowing, paling and leaf tip burn will usually be noticeable, and generally more pronounced in barley than wheat. These effects are temporary and usually disappear 10-14 days after treatment. All new growth develops normally and yields are not reduced. Applied under extreme stress conditions, Stampede CM may cause a slight delay in crop maturity, and some suppression of growth in flax. This will be offset by increased yield due to weed control. Frost within 24 hours of treatment or application after the 5 leaf stage of wheat and barley may cause long term crop injury.

Conditions under which poor results may be expected:

1. Applications made at a later than recommended stage of weed growth.
2. Inadequate spray coverage due to low water volumes, faulty or improper equipment or interception of spray by a mature, dense crop and weed canopy.
3. Stress conditions will trigger earlier development of weed resistance and a potential for crop injury.

11. **EFFECTS OF RAINFALL:** Rainfall more than 1 hour after treatment will not affect performance.

12. **MOVEMENT IN SOIL:** Not applicable.

13. **GRAZING AND CROPPING RESTRICTIONS:**

Drift: Danger is low, MCPA has a low volatility. Do avoid drift to phenoxy susceptible crops such as rapeseed, vegetables, and ornamentals.

Grazing Restrictions: None on label.

Crop Use After Hail: No restrictions.

Succeeding Crops: No restrictions

14. **TOXICITY:**

Oral LD₅₀ (rat) - 1950 mg/kg

Dermal LD₅₀ (rabbit) 8 2190 mg/kg

15. **SAFETY AND PRECAUTIONS:** Can cause giddiness, intoxication and headache due to solvent. Prolonged exposure can cause skin irritation. Avoid breathing the spray mist and avoid swallowing.

First Aid: In case of contact with skin, wash thoroughly with soap. In case of contact with eyes, flush with water for at least 15 minutes and get medical attention. If taken internally, induce vomiting by inserting finger in throat, then drink plenty of water. Get medical attention immediately.

16. **STORAGE:** Heated storage is not required. If material is stored below -18°C, it is advisable to place in a warm location for several days and agitate pails. Any crystal formation will redissolve, and activity will remain unaffected.

17. **WHERE AVAILABLE:** Alberta Wheat Pool, Cargill Grain, Federated Cooperative Ltd., Pfizer Chemicals, Pioneer Grain, and United Grain Growers.

Additional information available from:

Rohm & Haas Canada Inc.
Prairies Regional Office
Suite #14 - 830 King Edward Street
Winnipeg, Manitoba
R3H 0P5
Phone: (204) 774-1755

SWEEP (Paraquat)

1. **FORMULATION:** Water soluble solution 250 g/L
Available in 20 litre containers
2. **REGISTERED MIXES:** Sweep-2,4-D
Sweep-MCPA
Sweep-Bromoxynil/MCPA
Sweep-Dicamba/2,4-D or MCPA
Sweep-Lorox/MCPA

Mix Restrictions: When using amine formulations use immediately.

Mixing with other pesticides: Not applicable

3. **CROPS:** Summerfallow

Underseeding: Not applicable

4. **WEEDS CONTROLLED:** Annual grasses and when tank-mixed with the appropriate broadleaf herbicide, annual broadleaf weed control as well.
5. **WEEDS SUPPRESSED:** Most perennial weeds
6. **WHEN USED:** At the 2-4 leaf stage of annual weeds.
7. **HOW TO APPLY:**

With: Ground equipment
Rate: 2.25 L/ha for annual grass control and when tank-mixed with broadleaf herbicides, use the rates of those materials recommended for use in the situation involved.
Water Volume: 100 L/ha
Use higher volumes when foliage is dense or weeds are in the 4 leaf stage.
Incorporation: Not applicable
Pressure: 300 kPa
Ground Speed: 9 km/h
Nozzles: All standard nozzles delivering the correct volume.
Protective Equipment: Prevent skin or eye contact and do not breathe spray mist - wear rubber gloves, approved face mask and eye shield when handling the concentrate.

8. **SPRAYING TIPS:**

- Use high volume, low pressure-type spraying equipment to apply the appropriate number of litres per hectare. Foliage must be thoroughly covered to obtain good results.
- Applications made on cloudy days, during dull sunlight or just prior to or during periods of darkness will generally increase the subsequent effectiveness of the treatment.
- Do not apply with mist blowers.
- It is important to thoroughly wash equipment after spraying - use a wetting agent (Agral 90 at 60 mL/100 litres of water), flush and spray out, then thoroughly rinse with clean water. When possible, the equipment should be filled with clean water and left overnight. Spray out before storing equipment or using for other materials.

9. **HOW IT WORKS:** Sweep is absorbed by all leaf and stem surfaces, but it does not move in the plant. Once inside the plant Sweep interferes with photosynthesis in the plant. This is followed by yellowing and eventual death of the plant.

10. **EXPECTED RESULTS:**

Weeds: Sweep provides immediate, fast and virtually complete annual grass control. Repeat applications will be necessary when new weeds emerge. Usually yellowing will occur within a few hours of application. Desiccation of the plant will continue rapidly and eventual death will occur. When tank-mixed with a broadleaf herbicide, Sweep will provide control of most annual weeds.

Crop: Not applicable.

Conditions under which poor results may be expected:

1. Rain prior to the spray solution drying on plant.
2. Use clean (non-turbid) water for spraying Sweep. Muddy water will reduce the effectiveness of the chemical.
3. Inadequate coverage of green foliage.

11. **EFFECTS OF RAINFALL:** Once the spray solution has dried on the plant tissue, rain will not reduce the effectiveness of Sweep.
12. **MOVEMENT IN SOIL:** None

13. GRAZING AND CROPPING RESTRICTIONS:

Drift: Avoid application or drift onto crops, ornamental plants, lawns, grazing areas or other desirable growth.

Grazing Restrictions: Not applicable

Crop use after hail: No restriction

Succeeding Crops: No restriction

14. TOXICITY:

Human: High if concentrate or dilute spray ingested

Fish and Wildlife: Acute oral LD₅₀ - 120 mg paraquat ion/kg

Bees: Not applicable

15. SAFETY AND PRECAUTIONS: May be fatal if swallowed. May irritate eyes, nose, throat and skin. Avoid breathing spray mist and avoid contact with skin, eyes and clothing.

First Aid: If swallowed, induce vomiting if not already occurring. Get to nearest hospital FAST. THIS IS ESSENTIAL. If delay unavoidable, administer fluids and induce further vomiting. If in eyes, flush with clean water for 15 minutes and get medical attention. If on skin, wash thoroughly with water. Remove contaminated clothing immediately; wash before re-use.

For Physician: The following information is relevant because Sweep contains paraquat. If swallowed, give stomach wash-out and test urine and astric aspirate for paraquat. If positive, give up to 1 litre of adsorbent suspension (30% Fuller's Earth, activated charcoal or amberlite resin) mixed with a purgative (MgSO₄, NaSO₄ or mannitol). Repeat administration of adsorbent suspension for the next 24 hours, plus purgatives as required. Maintain and monitor electrolyte and fluid status daily. Consider haemodialysis or haemoperfusion, using charcoal column. Delay oxygen as long as possible. If in eyes, treat symptomatically, using antibiotics and steroids as necessary. Emergency telephone number 416/643-4123 8:00 a.m.- 4:45 p.m. After hours 416/528-6771 (state as calling for Chipman).

16. STORAGE: Sweep will crystalize if subjected to freezing temperatures. It, therefore, requires heated storages.

17. WHERE AVAILABLE: Sweep is available from almost all major grain companies and from many independent farm supply dealers.

Additional information available from:

Chipman Inc.

P.O. Box 965

Winnipeg, Manitoba

R3C 2V5

Phone: (204) 786-3421 or Toll Free (800) 665-4657

TARGET (MCPA, mecoprop and dicamba)

1. **FORMULATIONS:** Water soluble solution containing 275 g/L MCPA, 62.5 g/L mecoprop and 62.5 g/L dicamba. Available in 20 litre containers.
2. **REGISTERED MIXES:** None
3. **CROPS:** Hard red spring and durum wheat, barley, oats
4. **WEEDS CONTROLLED:** Buckwheat (tartary and wild), corn spurry, cow cockle, hemp-nettle, flixweed, knotweed, lamb's quarters, mustards, pigweed (prostrate, redroot) shepherd's purse, smartweeds (annual) sow-thistle (annual), stink-weed
5. **WEEDS SUPPRESSED:** Canada thistle, field bindweed, hedge bindweed
6. **WHEN USED:** Wheat - 2-5 leaf stage
Barley - 2-3 leaf stage
Oats - 2-5 leaf stage
Weed growth stage - 2-5 leaf stage
Note: Treatment at other than recommended crop stage may cause injury.
7. **HOW TO APPLY:**

With:	Equipment that will apply 100 L/ha
Rate:	1.0 - 1.5 L/ha (At 1.0 L/ha, one 20 L pail will treat 20 ha)
Water Volume:	100 L/ha
Incorporation:	Not applicable
Pressure:	Sufficient for good coverage
Speed:	Sufficient for good coverage
Nozzles:	All standard and low pressure nozzles delivering 100 L/ha
Protective Equipment:	Standard protective equipment used when applying herbicides.
8. **SPRAYING TIPS:** None specified.
9. **HOW IT WORKS:** Target is a combination of three systemic hormonal herbicides which accumulate in the growing point of susceptible plants, produce abnormal growth and disrupt the transport system in plants.
10. **EXPECTED RESULTS:**

Weeds: Due to slow translocation of the chemical in the plant and the influence of growing conditions, effect on weeds becomes visible within 7-14 days after spraying - leaves curl, leaf petioles twist, leaf edges turn brown, whole plant ceases growth and eventually turns brown and dies.

Crop: Improper application can result in abnormal bending at the nodes of grain stalks, difficulty in head emergence from sheath, curled awns, malformed kernels and sterile florets.

Conditions under which poor results may be expected:

 1. Inadequate coverage
 2. Rainfall shortly after application
 3. Weeds overmature
11. **EFFECTS OF RAINFALL:** Do not spray if rain is expected within 6 hours.
12. **MOVEMENT IN SOIL:** Not applicable.
13. **GRAZING OR CROPPING RESTRICTIONS:**

Drift: Tomatoes, sugar beets, sunflowers, beans, turnips, cauliflower, cabbage, ornamentals and fruit crops are very sensitive to drift.

Grazing Restrictions: No haying or grazing restrictions at recommended rate.

Crop use after hail: No restrictions.

Succeeding Crops: No restrictions.
14. **TOXICITY:** Fish & Wildlife: Rat-Acute Oral LD₅₀ - 1028 mg/kg
Rainbow Trout - median tolerated limit 96 hrs - 28,000 ppm
Bees: LD₅₀ for dicamba alone 3.6 micrograms/bee

15. SAFETY AND PRECAUTIONS:

First Aid: If on skin, wash with soap and water. If in eyes, flush with clear water for 15 minutes. If swallowed, induce vomiting. Obtain prompt medical attention.

16. STORAGE: Heated storage only.

17. WHERE AVAILABLE: Green Cross Products

Additional information available from:

Green Cross Products
820 - 26 Street N.E.
Calgary, Alberta
T2A 2M4
Phone: (403) 273-5656

TORCH (bromoxynil)

1. FORMULATIONS: Emulsifiable concentrate, 227 g/L
Available in 20 litre containers

2. REGISTERED MIXES: Torch + Avenge
Torch + Hoe-Grass
Torch + Round-up
Torch + 2,4-D Amine
Torch + 2,4-D Ester
Torch + MCPA Amine
Torch + MCPA Ester

Mix Restrictions: If the amine of 2,4-D or MCPA is added, mix it into the water first, then add Torch

Mixing with other Pesticides: Not recommended.

3. CROPS: Spring wheat, oats, barley, flax, canary seed, sweet corn, and field corn.

Underseeding: Not recommended.

4. WEEDS CONTROLLED: Annual smartweeds, buckwheat (Tartary and wild), common groundsel, cow cockle, kochia, lamb's-quarters, night-flowering catchfly, redroot pigweed, Russian thistle, stinkweed, wild mustard.

5. WEEDS SUPPRESSED: None

6. WHEN USED:

a) Weeds

- Seedling to 4-leaf stage for cow cockle and wild mustard.
- Seedling to 5 cm high for Russian thistle
- Torch gives best results when weeds are young and actively growing. Spraying past the 6-leaf stage may result in reduced control.

b) Crops

- Wheat, Barley & Oats: 2-leaf to early flag-leaf stage.
- Flax: 5-10 cm high
- Canary Seed: 3 to 5-leaf stage
- Corn: Apply before crop is 25 cm in height.

7. HOW TO APPLY:

With: Ground Sprayer

- Spraying application is not recommended
- Reduced control may be expected with floaters, unless modifications for post emergence application are made:
 - use 150 L water/ha
 - use 275 kPa
 - DO NOT exceed a forward speed of 18 km/h
 - DO NOT use flood-jet tips

Rate: Wheat, barley oats: 1.25-1.5 L/ha
Flax: 1.25 L/ha
Canary Seed: 1.25-1.5 L/ha
Corn (Field and Sweet): 1.5-1.75 L/ha
(One 20 litre container treats 16 ha at the 1.25 L/ha rate)

- Use higher rate when weeds are past the 4-leaf stage
- Under heavy infestation of wild mustard or redroot pigweed (150 plants/m²), apply the higher rate of Torch (1.5 L/ha).
- In corn use the higher rate of application for control of triazine resistant annual broadleaf weeds including lamb's-quarters and redroot pigweed.

Water Volume: Wheat, barley, oats, flax, and canary seeds 100 L/ha
Corn: 150 L/ha

Incorporation: Not applicable

Pressure: 275 kPa

Ground Speed: 9 km/h

Nozzles: Flood-jet nozzles and low pressure nozzles are not recommended.

Protective Equipment: Standard protective equipment used when applying herbicides.

8. SPRAYING TIPS:

- Do not apply to wheat, barley or oats during or after the boot stage or on those crops underseeded to legumes.
- Do not apply to corn or flax when plants are under stress: drought conditions, hot humid weather with daytime temperatures over 30°C.
- For best results, broadleaf weeds should be in the seedling to 4-leaf stage of growth. Use higher rate when weeds are past the 4-leaf stage.

9. HOW IT WORKS: The herbicide is absorbed by the foliage but not translocated once absorbed. It inhibits the plant's photosynthesis and respiration, thereby killing it.

10. EXPECTED RESULTS:

Weeds: Affected plant will turn brown within 3-5 days of application. More active when weeds are growing rapidly.

Crop: In flax, some leaf burn and retarded growth may delay maturity 2 to 3 days. Do not treat when flax plants are under stress. In corn, some leaf burn may occur. Do not treat when corn plants are under stress.

Conditions under which poor results may be expected:

1. Late spraying: majority of weeds past the 5-6 leaf stage
2. Inadequate coverage
3. Too low a spray pressure

11. EFFECTS OF RAINFALL: Resistant to removal by rainfall.

12. MOVEMENT IN SOIL: Not applicable

13. GRAZING AND CROPPING RESTRICTIONS:

Drift: Danger from drift is low

Grazing Restriction: None

Crop use after Hail: No restrictions

Succeeding crops: No restrictions

14. TOXICITY:

Fish & Wildlife: Rat LD₅₀ - 245 mg/kg. Toxic to fish, so do not contaminate water. No systemic toxicity noted.

15. SAFETY AND PRECAUTIONS: Do not inhale fumes and avoid breathing spray mist. Avoid contact with skin, eyes, and clothing.

First Aid: If on skin wash thoroughly with soap and water. For eyes wash with clean water or suitable eye wash for 10-15 minutes. Get medical attention.

16. STORAGE: Store in heated area. Do not freeze. Torch may crystalize if frozen. If crystallization has taken place, warm the drum in warm room or sun, with frequent agitation until crystals are dissolved. No deterioration in 2 years storage time.

17. WHERE AVAILABLE: Alberta Wheat Pool, United Grain Growers, United Farmers of Alberta, Oliver Industrial Supply, Pioneer Grain, Cargill Grain, Shell Dealers, Niagara Dealers.

Additional information available from:

Allied Chemical Services Ltd.
5507 - 1 Street S.E.
Calgary, Alberta
T2H 1H9
Phone: (403) 253-8471

TORDON 202C (picloram + 2,4-D)

1. FORMULATIONS: Picloram 12 g/L
2,4-D 200 g/L
Available in 20 litre containers

2. REGISTERED MIXES: None

3. CROPS: Wheat and barley

Underseeding: Not recommended.

4. WEEDS CONTROLLED: Buckwheat (Tartary and wild), Cockle bur, green smartweed, lamb's-quarters, redroot pigweed, Russian thistle, wild mustard and spring seedlings of stinkweed and dandelion.

Topgrowth: Canada thistle, perennial sow-thistle.

5. WEEDS SUPPRESSED: Scentless chamomile, cow cockle.

6. WHEN USED: 3-5 leaf stage of crop. Seedling (2-4 leaf) stage of weeds.

7. HOW TO APPLY:

With: Ground equipment
Rate: 1.5-2.0 L/ha
(At 1.5 L/ha rate, one 20 L container will do 13.3 ha)
Water Volume: 100 L/ha
Incorporation: Not applicable
Pressure: 275 kPa
Ground Speed: 9 km/h
Nozzles: All standard, low pressure delivering 100 L/ha
Protective Equipment: Standard protective equipment used when applying herbicides.

8. SPRAYING TIPS: Treat during warm weather when the weeds are young and growing actively.

9. HOW IT WORKS: Absorbed by leaf and stem surfaces and translocated throughout the plant to the growing points. Also absorbed by roots through the soil. Remains in the soil to control the late germinating weed seedlings.

10. EXPECTED RESULTS: The weeds will not die immediately after treatment but will slow and cease growth and not compete with the crop nor interfere with harvest. Use higher rates under dry or cool conditions.

11. EFFECTS OF RAINFALL: Rainfall within 4 to 6 hours of application may reduce activity.

12. MOVEMENT IN SOIL: Not applicable.

13. GRAZING AND CROPPING RESTRICTIONS:

Drift: Small amounts of picloram and 2,4-D can damage certain desirable broadleaf plants including alfalfa, potatoes, sunflowers, sugar beets, beans, tomatoes, other vegetable crops, fruit and ornamental trees. Spray in a manner which will minimize spray drift.

Use of Straw from Treated Fields: Do not use straw from treated crops for compost or mulching on susceptible broadleaf crops. If straw is used for bedding or animal feed return the manure to fields to be planted to grain crops, flax or rapeseed.

Succeeding Crops: Do not plant susceptible broadleaf crops such as sunflowers, beans, peas or potatoes the year following treatment. Fallow or replant to grain crops including wheat, barley, oats, flax and rapeseed.

Handling Treated Soils: Treated soil should not be moved to other areas, nor should it be used to grow susceptible broadleaf plants unless an adequately sensitive bioassay or chemical test shows that no detectable picloram is present.

14. TOXICITY: Human: Low in toxicity.
Rats: LD₅₀ 2,460 mg/kg
Bees: Non-toxic
Fish: Low in toxicity.

15. SAFETY AND PRECAUTIONS: Harmful if swallowed. Causes eye irritation.

First Aid: In case of contact, flush eyes and skin with plenty of water. Get medical attention for eyes. Remove contaminated clothing and wash before reuse. Harmful if swallowed.

16. STORAGE: Store Tordon 202C herbicide away from food, feedstuffs, fertilizer, seed, insecticides, fungicides or any other pesticides and protect it from freezing. If freezing occurs, warm and mix thoroughly before using.
17. WHERE AVAILABLE: Oliver, Pfizer, Cargill, U.G.G., Alberta Wheat Pool, Federated Cooperatives.

Additional information available from:

Dow Chemical of Canada Limited
Suite 2412, 10025 Jasper Avenue
Edmonton, Alberta
T5J 1S6
Phone: (403) 428-0439

TOTRIL (ioxynil)

1. FORMULATIONS: Emulsifiable concentrate 225 g/L
Available in 5 litre containers
2. REGISTERED MIXES: Totril + Compitox (turf only)
3. CROPS: Onions (seeded and transplanted), seedling turf
4. WEEDS CONTROLLED: Lamb's-quarters, ragweed, redroot pigweed, lady's-thumb, common groundsel, mustard, wild radish, oakleaved goosefoot, wild buckwheat, shepherd's-purse, chickweed, purslane, spurge, dandelion, stinking mayweed.
5. WEEDS SUPPRESSED: Not applicable
6. WHEN USED:
 - seeded onions after plants have 3 fully developed true leaves.
 - transplanted onions after they become established.
 - turf after grass is 2.54 cm in height.

7. HOW TO APPLY:

With: Ground equipment
Rate: Onions 2 L/ha
Turf 2.75-4.25 L/ha
(At 2.75 L/ha rate, one 5 L container treats 1.8 ha).
Water Volume: 450 L/ha
Pressure: 275 kPa
Ground Speed: 9 km/h
Nozzles: Any standard nozzle delivering 450 L/ha
Protective Equipment: Standard protective equipment used when applying herbicides.

8. SPRAYING TIPS:

- Do not spray in hot, humid weather conditions.
- Spray when weeds are in seedling stage.

9. HOW IT WORKS: Totril is a contact type herbicide, therefore, good spray coverage of weeds is essential for control. Weeds are more sensitive at young stages of growth.

10. EXPECTED RESULTS: Depending on the weather, weeds should "crisp up" in 2 to 7 days after spraying.

Crop: Scorch to older onion leaves may be noticed following treatment. Some injury in the form of leaf scorch, discolouration, stunting or distortion may occur if application is made in hot humid weather or under adverse conditions.

Conditions under which poor results may be expected:

1. Improper sprayer calibration.
2. Use of less than 450 L/ha.
3. Weeds too far advanced.
4. Spraying in hot, humid weather.

11. EFFECTS OF RAINFALL: No effect

12. MOVEMENT IN SOIL: No movement

13. GRAZING AND CROPPING RESTRICTIONS:

Drift: Only broadleaved crops could be affected. Danger from drift is low.
Succeeding Crops: No restrictions.

14. TOXICITY: Fish and Wildlife: Rat acute oral LD₅₀ - 190 mg/kg

15. SAFETY AND PRECAUTIONS: Avoid breathing spray mist.

First Aid: In case of accidental skin or eye contact, the affected areas should be thoroughly washed with cold water, followed by a saline wash in the case of eye contact and washing with soap and water in the case of skin contact. This product contains an aromatic hydrocarbon solvent. In case of accidental swallowing DO NOT induce vomiting. If patient is unconscious, give him air. Call a physician immediately.

16. STORAGE: Store in heated area.
17. WHERE AVAILABLE: Oliver Chemical

Additional information available from:

May & Baker Canada Inc.
1147 - 17 Avenue S.W.
Calgary, Alberta
T2T 0B7
Phone: (403) 245-3148

TREFLAN (trifluralin) (Cereals)

1. **FORMULATION:** Emulsifiable concentrate 400 g/L
Available in 10 litre, 22.7 litre and 113.7 litre containers

2. **REGISTERED MIXES:** Treflan + Avadex
Treflan + Liquid Fertilizer
Treflan + Avadex + Liquid Fertilizer

Mix Restrictions: Add Treflan or Treflan + Avadex directly into the fluid fertilizer, mix thoroughly and apply as soon as possible. Constant agitation is required until application is complete.

3. **CROPS:** Barley and wheat

Underseeding: Not recommended.

4. **WEEDS CONTROLLED:** Green foxtail

5. **WEEDS SUPPRESSED:** None.

6. **WHEN USED:** Apply Treflan or Treflan + Avadex tank mix combination in the spring after planting and prior to emergence of wheat or barley.

7. **HOW TO APPLY:**

With: Ground equipment
Rate: 1.5 L/ha Treflan 4EC on light to medium textured soil. 2.0 L/ha Treflan 4EC on heavy textured soil.
(One 10 litre container treats 6.7 ha at 1.5 L/ha rate).
Water Volume: 100 L/ha.
Incorporation: Incorporate shallowly by two cross harrowings with tyne or diamond harrows operated at a speed of at least 8 km/h. Both incorporations should be done within 8 hours of application.
Pressure: Use low pressure.
Ground Speed: No restriction.
Nozzles: Standard and low pressures nozzles delivering 100 L/ha
Protective Equipment: Rubber gloves and goggles are recommended. In cases of prolonged contact in enclosed places, a Wilson R-25 cartridge respirator is recommended.

8. **SPRAYING TIPS:**

- Application should be made only on fields that are trash free or summerfallow fields.
- Crop must be seeded prior to application of chemical and to a depth of 5-8 cm in a well tilled seedbed to prevent contact between the chemical and the seed.

9. **HOW IT WORKS:** Treflan acts on both the root and shoot tips as they emerge from the seed. Treflan is more active on the root tip than on the shoot tip. The chemical prevents cell division and affected plants die before emerging to the soil surface. If the shoot portion of the plant does escape to the soil surface, lateral or secondary root growth is inhibited causing a slow death since the plant is not able to actively gather moisture or nutrients.

10. **EXPECTED RESULTS:**

Green Foxtail: The majority of green foxtail seed is found within the top 3 cm of soil, which is treated with Treflan. These seeds are especially sensitive to Treflan and will die prior to emerging from the soil. Seeds that germinate from deeper in the soil will produce plants that do emerge. The secondary root system of these plants must form within 2 cm of the soil surface and is completely inhibited by Treflan present in that area. The affected plant then dies slowly as crop competition and temperature stress overtax the rootless plants' ability to provide moisture.

Crop: The crop must be seeded prior to application of Treflan or Treflan plus Avadex and must be seeded to a depth of 5-8 cm so that the seed does not come into contact with the Treflan layer. If this practice is followed no crop injury will result.

Conditions under which poor results may be expected:

1. Too low a rate for proper weed control.
2. Trash cover that prevents the proper incorporation of the chemical into the soil.
3. Improper incorporation, one incorporation or no incorporation.
4. Lumpy or wet soil that prevents proper incorporation of the chemical.

11. **EFFECT OF RAINFALL:** Rainfall does not effect Treflan activity once incorporated into the soil.

12. **MOVEMENT IN THE SOIL:** Treflan is not leached in the soil.

13. GRAZING AND CROPPING RESTRICTIONS: None

Crop use after hail: No restrictions

Succeeding Crops: No restrictions

14. TOXICITY:

Wildlife: Rat LD₅₀ 10 g/kg

Fish: In pure water, fish are extremely sensitive to Treflan 4EC. Under runoff conditions or in muddy water the suspended soil binds Treflan very strongly and large amounts of Treflan can be tolerated by fish.

Bees: Non-toxic.

15. SAFETY AND PRECAUTIONS: Harmful if swallowed or absorbed through the skin. Avoid contact with skin, eyes or clothing.

First Aid:

A. Eye - Flush with large amounts of water and contact a physician if irritation develops.

B. Skin - Wash all exposed areas with soap and water. Wash all contaminated clothing before reuse.

C. Inhalation - If discomfort occurs, move to fresh air. If breathing difficulty occurs, start mouth-to-mouth artificial respiration and contact a physician.

D. Ingestion - Contact a physician immediately. If swallowed, induce vomiting. Then give at least 285 mL of water to children and 685 mL to adults. Make certain vomitus is not inhaled. After vomiting occurs, give 30-40 mL of activated charcoal in a few millilitres of water.

16. STORAGE: Treflan 4EC - if stored below -18°C bring contents to 15°C for 24 hours and shake well before using. Do not store in proximity of excessive heat, sparks or open flame.

17. WHERE AVAILABLE: Alberta Wheat Pool, Cargill Grain Company, Pioneer Grain Company, Federated Co-op, Canbra Foods, Van Waters & Rogers, United Grain Growers.

Additional information available from:

Elanco Products Division
Eli Lilly and Company (Canada) Ltd.
Unit #3, 9829 - 44 Avenue
Edmonton, Alberta
T6E 5E6
Phone: (403) 436-7145

TREFLAN (trifluralin)
(Oilseeds, Special Crops, Vegetable Crops)

1. FORMULATIONS:

Emulsifiable concentrate 400 g/L

Available in 10 litre, 22.7 litre and 113.7 litre containers.

5% Granular (Treflan QR-5)

Available in 25 kg bags.

2. REGISTERED MIXES: Treflan 4EC + Liquid Nitrogen Fertilizer (28-0-0)

Mix Restrictions: Pour directly into liquid fertilizer, mix thoroughly and apply as soon as possible. Constant agitation is needed until application is complete.

Mixing with Other Pesticides: Not recommended.

3. CROPS: Rapeseed, mustard, sunflowers, peas, soybeans, dry beans, fababeans, flax*, crambe, snapbeans, lima beans, carrots, turnips, transplants of tomatoes, peppers, broccoli, brussel sprouts, cabbage and cauliflower; direct seeded cabbage and cauliflower.

* Fall application only.

Underseeding: Not recommended.

4. WEEDS CONTROLLED: Annual bluegrass, barnyard grass, brome grass, buckwheat (wild), chickweed, cow cockle, downy brome, foxtail (green and yellow), knotweed, lamb's-quarters, Persian dandelion, pigweed, purslane, Russian thistle, wild oats.

5. WEEDS SUPPRESSED: None

6. WHEN USED:

- a) Spring application: cultivate to destroy existing weeds and apply prior to planting crop in the spring.
 - b) Fall application: apply in the fall (September 1st to freeze-up) prior to planting in the spring of the next year.
 - c) Summer application: apply to summerfallow in the summer (June 1st to September 1st) prior to planting in the spring of the next year.
- Apply prior to emergence of weeds.
Apply prior to seeding of crop.

7. HOW TO APPLY:

With: Ground equipment

Rate: **Spring Application**

2.75 L/ha Treflan 4EC on all medium and heavy textured soils and on sandy soils with greater than 6% organic matter. 2.0 L/ha Treflan 4EC on sandy soils with less than 6% organic matter. (One 20 L pail treats 7.3 ha at 2.75 L/ha rate).

Fall Application

Between September 1st and freeze-up 3.5 L/ha Treflan 4EC on all medium and heavy textured soils and on sandy soils with greater than 6% organic matter. 2.75 L/ha Treflan 4EC on sandy soils with less than 6% organic matter. 28 kg/ha Treflan QR-5 on all medium and heavy textured soils and on sandy soils with greater than 6% organic matter. 22 kg/ha Treflan QR-5 on sandy soils with less than 6% organic matter.

Summer Application

Between June 1st and September 1st 4.25 L/ha Treflan 4EC on all soils. 33 kg/ha Treflan QR-5 on all soils.

Special Instructions for Flax

Treflan 4EC and Treflan QR-5 cannot be spring applied for weed control in flax. Summer and fall application at the above rates are recommended for flax.

Water Volume for Treflan 4EC: 100 L/ha

Incorporation: Incorporation must be done within 8 hours of application. Treflan 4EC and Treflan QR-5 must be thoroughly mixed into the top 8-10 cm of soil. A tandem disc, discer or field (vibra shank) type cultivator are recommended for incorporation. These implements should be set to cut 8-10 cm and incorporation should be done twice at cross angles with the implement set at the same depth. To get the best mixing action, operate the disc implement at 7-10 km/h and the cultivator at 10-13 km/h.

Special Instructions for Flax

Spring application is not recommended. Both incorporations of Treflan 4EC or QR-5 must be done in the fall prior to seeding flax in the spring. The seedbed should be shallowly tilled in the spring and packed just prior to seeding to ensure a firm seedbed and accurate depth of planting. The remaining incorporation instructions for fall and summer application are as listed above.

Pressure:	Use adequate pressure to get proper coverage. Low pressure is preferred in windy conditions.
Ground Speed:	Not specified
Nozzles:	Nozzles that will apply 100 litres of spray at low pressure.
Protective Equipment:	Rubber gloves and goggles are recommended. In cases of prolonged contact in enclosed places, a Wilson R-25 cartridge respirator is recommended.

8. SPRAYING TIPS:

- Do not apply Treflan 4EC to soils with more than 20-25% straw cover. When applying to stubble fields, chop and thoroughly mix residues into the soil prior to addition of Treflan 4EC.
- Destroy all existing weed growth prior to application of Treflan 4EC.
- Treflan QR-5 can be used in conditions where trash is heavier but not so heavy as to limit incorporation.
- Standing weed growth can exist when Treflan QR-5 is applied, provided it does not interfere with distribution of the granule and does not limit incorporation. All existing weed growth must be killed by the incorporation procedures, since Treflan has no effect on established weeds.
- A tandem disc gives the best mixing action on stubble conditions.
- Do not use a field cultivator to incorporate Treflan when the soil is crusted, lumpy or too wet for good mixing.
- When fall application is used, it is preferred that both incorporations are completed in the fall.
- When fall or summer application is used, work the soil lightly to 5-8 cm depth in the spring prior to seeding.
- Do not apply Treflan on soils that are in poor working condition, wet soils or soils containing 15% or more organic matter.
- To avoid concentrating wild oat seeds below the treated layer, do not plow land prior to Treflan application.

9. HOW IT WORKS:

To work effectively, Treflan must be uniformly mixed throughout the soil in the zone of weed seed germination since it acts on the growing points of the root and shoot as they emerge from the seed. Treflan inhibits cell division and the actively growing points in the root and shoot. The effect on the roots is somewhat greater than the effect on the shoot.

The result of Treflan damage on weeds is death of the weed prior to emergence, since both root and shoot development are inhibited. If the shoot part of the weed escapes, it may show up as a puffy, slow growing shoot under the soil surface. This shoot is extremely brittle. The roots of affected plants show increased diameter near the tips and lateral and secondary root development is halted.

10. EXPECTED RESULTS:

The majority of susceptible weeds will be killed by Treflan before they ever reach the soil surface. In some cases the shoot part of the plant may appear at the soil surface and a leaf may develop. Further investigation will show that these weeds have no secondary root system and that existing roots are swollen and deformed. These weeds then die as temperature and crop competition increase because their reduced root systems are not capable of obtaining adequate moisture for growth.

Early spring observation of Treflan treated weeds prior to emergence will show a shoot that is growing slowly, puffy in appearance, deformed and very brittle to the touch.

Crop: Rapeseed, mustard, peas and sunflowers are extremely tolerant to Treflan at the normal rate. Flax must be seeded with special precautions. Seed flax into a well packed warm moist seedbed. Do not seed deeper than 4 cm.

Conditions under which poor results may be expected:

- Rate of chemical applied is below recommended level.
- Improper incorporation of the chemical, namely, single incorporation, use of improper equipment or incorporating too shallowly.
- Incorporation on soils that are too wet, lumpy or trashy to allow for proper mixing.

11. **EFFECT OF RAINFALL:** Rainfall does not affect Treflan activity once incorporated into the soil.

12. **MOVEMENT IN THE SOIL:** Treflan is not leached in the soil.

13. **GRAZING AND CROPPING RESTRICTIONS:** None

Crop use after hail: No restrictions

Succeeding Crops: Under normal conditions, Treflan carry over will not harm crops grown in rotation. As a precaution oats, sugar beets and small seeded annual grasses such as timothy, canary seed grass and creeping red fescue should not be grown in rotation following a Treflan treated crop.

14. TOXICITY:

Wildlife: Rat LD₅₀ 10 g/kg

Fish: In pure water, fish are extremely sensitive to Treflan 4EC. Under runoff conditions or in muddy water the suspended soil binds Treflan very strongly and large amounts of Treflan can be tolerated by fish.

Bees: Non-toxic.

15. SAFETY AND PRECAUTIONS: Harmful if swallowed or absorbed through the skin. Avoid contact with skin, eyes or clothing.

First Aid:

- a. Eye - Flush with large amounts of water and contact a physician if irritation develops.
- b. Skin - Wash all exposed areas with soap and water. Wash all contaminated clothing before reuse.
- c. Inhalation - If discomfort occurs, move to fresh air. If breathing difficulty occurs, start mouth-to-mouth artificial respiration and contact a physician.
- d. Ingestion - Contact a physician immediately. If swallowed, induce vomiting. Then give at least 285 mL of water to children and 685 mL to adults. Make certain vomitus is not inhaled. After vomiting occurs, give 30-40 mL of activated charcoal in a few millilitres of water.

16. STORAGE: Treflan 4EC - if stored below -18°C bring contents to 15°C for 24 hours and shake well before using. Do not store in proximity of excessive heat, sparks or open flame.

17. WHERE AVAILABLE: Alberta Wheat Pool, Cargill Grain Company, Pioneer Grain Company, Federated Co-op, Canbra Foods, Van Waters & Rogers, United Grain Growers.

Additional information available from:

Elanco Products Division
Eli Lilly and Company (Canada) Ltd.
Unit #3, 9829 - 44 Avenue
Edmonton, Alberta
T6E 5E6
Phone: (403) 436-7145

TROPOTOX (MCPB)

1. **FORMULATIONS:** Water soluble solution 400 g MCPB per litre.
Available in 4 and 20 litre containers.
2. **REGISTERED MIXES:** None
3. **CROPS:** Peas
4. **WEEDS CONTROLLED:** Bull thistle, Canada thistle, curled dock, flixweed, field bindweed, hemp-nettle, lamb's-quarters, mustards (ball, wild and wormseed), plantain, ragweed, redroot pigweed, purslane, shepherd's-purse, smartweeds (annual) sow-thistle (annual), stinkweed, tall buttercup.
5. **WEEDS SUPPRESSED:** Not applicable.
6. **WHEN USED:** Peas - 3-6 expanded leaves. Weeds - susceptible stage (see product label for specifics).
7. **HOW TO APPLY:**

With: Ground equipment
Rate: 3.5-4.25 L/ha depending on weeds to be controlled. (One 20 L container treats 5.7 ha at the 3.5 L/ha rate).
Water Volume: 150-200 L/ha
Pressure: 275 kPa
Ground Speed: 9 km/h
Nozzles: All standard nozzles delivering 150-200 L/ha.
Protective Equipment: Standard protective equipment used when applying herbicides.

8. **SPRAYING TIPS:** Spray in warm weather when plants are growing well.
9. **HOW IT WORKS:** A systemic absorbed by leaves and stem translocated to actively growing regions of plant where it disrupts cell division, causes cell growth and interferes with respiration and food reserves. Some plants convert MCPB to MCPA quite efficiently, while others (peas) do not. This factor is the basis for selective use in certain legumes.
10. **EXPECTED RESULTS:**

Broadleaved weeds: Should be dead within 2-3 weeks of treatment.

Conditions under which poor results may be expected:

1. Improper water volume
2. Weeds too far advanced.

11. **EFFECTS OF RAINFALL:** Rainfall before the foliage has dried from the spraying may decrease activity.
12. **MOVEMENT IN SOIL:** Not applicable.
13. **GRAZING AND CROPPING RESTRICTIONS:** None listed
14. **TOXICITY:** Fish and Wildlife: 500 mg/kg (acute oral LD₅₀ rat)
Bees: Non toxic
15. **SAFETY AND PRECAUTIONS:** After use wash hands and skin contaminated by spray or concentrate.
16. **STORAGE:** Store in heated area.
17. **WHERE AVAILABLE:** Alberta Wheat Pool, Pioneer, Federated Cooperatives, Pfizer, Niagara, Cargill, Oliver, Green Cross, Chipman.

Additional information available from:

May & Baker Canada Inc.
1147 - 17 Avenue S.W.
Calgary, Alberta
T2T 0B7
Phone: (403) 245-3148

TROPOTOX PLUS (MCPB + MCPA)

1. FORMULATIONS: Water soluble solution 375 g MCPB + 25 g MCPA/litre
Available in 4 and 20 litre containers.
2. REGISTERED MIXES: None
3. CROPS: Spring wheat, barley, oats, fall rye, seedling clover (wild white, Dutch white, Ladino, alsike and red clovers), peas, pasture, field corn.

Underseeding: For clover can be used on a cereal companion crop.

4. WEEDS CONTROLLED: Bull thistle, Canada thistle, curled dock, field bindweed, hemp-nettle, knotweed, lamb's-quarters, mustards (ball, wormseed and wild), purslane, ragweed, redroot pigweed, shepherd's-purse, smartweeds (annual), sowthistle (annual), stinkweed, tall buttercup.
5. WEEDS SUPPRESSED: Not applicable.
6. WHEN USED:

Cereals	- 2 leaf to flag leaf stage
Clover	- after spade leaf stage to fourth true leaf stage
Peas	- 3-6 expanded leaves
Pasture	- after grazing or cutting
Corn	- 45 cm high to beginning of tasseling with drop nozzles
Weeds	- susceptible stage (see product label for specifics)

7. HOW TO APPLY:

With: Ground equipment
Rate: 2.75-4.25 L/ha depending on weeds to be controlled (A 20 L container treats 7.3 ha at the 2.75 L/ha rate).
Water Volume: 150-200 L/ha
Pressure: 275 kPa
Ground Speed: 9 km/h
Nozzles: All standard nozzles delivering 150-200 L/ha
Protective Equipment: Standard protective equipment used when applying herbicides.

8. SPRAYING TIPS: Spray in warm weather when plants are growing well.
9. HOW IT WORKS: A systemic absorbed by leaves and stems, translocated to actively growing regions, where it disrupts cell division, causes cell growth and interferes with respiration and food reserves. Some plants convert MCPB to MCPA quite efficiently, while others (clover) do not. This factor is the basis for selective use in certain legumes.

10. EXPECTED RESULTS:

Broadleaved weeds: Should be dead within 2-3 weeks of treatment.

Conditions under which poor results may be expected:

1. Improper water volume.
2. Weeds too far advanced.

11. EFFECTS OF RAINFALL: Rainfall before the foliage has dried from the spraying may decrease activity.
12. MOVEMENT IN SOIL: Not applicable
13. GRAZING AND CROPPING RESTRICTIONS: None listed.
14. TOXICITY: Fish and Wildlife: 500 mg/kg (acute oral LD₅₀ rat)
Bees: Non toxic
15. SAFETY AND PRECAUTIONS: After use wash hands and skin contaminated by spray or concentrate.
16. STORAGE: Store in heated area.
17. AVAILABLE FROM: Alberta Wheat Pool, Pioneer, Federated Cooperatives, Pfizer, Niagara, Cargill, Oliver, Green Cross, Chipman

Additional information available from:

May & Baker Canada Inc.
1147 - 17 Avenue S.W.
Calgary, Alberta
T2T 0B7
Phone: (403) 245-3148

WYPOUT, WYPOUT 250 (barban)

1. FORMULATIONS: Emulsifiable concentrate
Wypout 120 g/L
Wypout 250 240 g/L
Available in 20 litre containers.

2. REGISTERED MIXES: Wypout 120 g/L + Endaven

Mixing with other pesticides: Not recommended

- | | |
|---|---|
| <ol style="list-style-type: none"> 3. CROPS: Wypout - <ul style="list-style-type: none"> Spring wheat Durum wheat Barley Lentils Rapeseed Mustard Fababeans Sunflowers Flax Peas Alfalfa Sweet clover Red clover Alsike clover Smooth brome grass Russian wild ryegrass Timothy Creeping red fescue Crested wheatgrass | <ol style="list-style-type: none"> Wypout 250 - <ul style="list-style-type: none"> Barley Lentils Rapeseed Mustard Fababeans Sunflowers Flax Peas Alfalfa Sweet clover Red clover Smooth brome grass Russian wild ryegrass Timothy Creeping red fescue Crested wheatgrass |
|---|---|

4. WEEDS CONTROLLED: Wild oats

5. WEEDS SUPPRESSED: None

6. WHEN USED: When the majority of the wild oats are in the two leaf stage and the crop in the proper stage of growth (refer to label). Crop injury may occur if sprayed earlier or later than recommended.

7. HOW TO APPLY:

With:	Aircraft or ground equipment
Rate:	Wypout: 2.32-3.51 L/ha Wypout 250: 1.05-1.75 L/ha
Water Volume:	Ground equipment - 40-100 L/ha
Incorporation:	Not applicable
Pressure:	350 kPa, Spray Coupe with special nozzles to 512 kPa
Ground Speed:	8 km/h, Spray Coupe with special nozzles to 13 km/h
Nozzles:	Monarch 20 and 22
Ground Equipment:	Monarch 20 and 22 Spray Jet 65-067 Teejet 650067 - 730077 - 800067
Spray Coupe:	Teejet 730116 and 73154* LF 1.16-73, LF 1.54-73* * Use only at 512 kPa and 13 km/h
Protective Equipment:	Standard protective equipment used when applying herbicides.

8. SPRAYING TIPS:

- Nozzles should be tilted 45° forward.
- Do not spray when plants are wet with dew or rain.
- Rain within 15 minutes of spraying will not affect performance.
- Crop damage may occur if sprayed within 24 hours of frost.
- Do not add additional surfactants, wetting agents to spray solution.

9. HOW IT WORKS: Wypout and Wypout 250 are systemic herbicides which are absorbed by the plant at the ligule (collar region) and the area just above the shoot or coleoptile. They stop cell elongation and cell division as well as interfering with translocation of sugar to new tissue within the plant. Crop competition is necessary to provide control of wild oats.

10. EXPECTED RESULTS:

Wild oats: Any wild oats past the two leaf stage may not be controlled. Wild oats which emerge after spraying will not be controlled. Affected plants will turn blue green and remain stunted throughout the growing season.

Crop: No effect noted on crop. With Wypout 250 on wheat, a temporary blue green effect on the plant may be noticed.

11. EFFECTS OF RAINFALL: Rain 15 minutes after spraying will not effect wild oat control.

12. MOVEMENT IN SOIL: Not applicable

13. GRAZING AND CROPPING RESTRICTIONS:

Drift: Do not allow spray to drift onto adjacent field, particularly if planted to oats, rye or buckwheat.

Grazing restrictions: Do not graze or feed crop until 5 weeks after treatment.

Crop use after hail: Do not use for five weeks after treatment.

Succeeding: No restrictions.

14. TOXICITY: Fish and Wildlife: Rat LD₅₀ - 1350 mg/kg
Bees: Non toxic

15. SAFETY AND PRECAUTIONS: Wypout is a skin irritant and sensitizer to some people. Avoid contact with skin, eyes and clothing.

First Aid: If swallowed **do not** induce vomiting. Get medical attention immediately. In case of skin contact, wash immediately with soap and water. Wash thoroughly after each use. In case of eye contact, flush eyes with water for 15 minutes. Get medical attention.

16. STORAGE: Store in heated area. Product may crystallize if stored below 0°C. To reconstitute warm to + 10°C and agitate well.

17. WHERE AVAILABLE: Uniroyal Chemical

Additional information available from:

Uniroyal Chemical
4 - 1323 - 44th Avenue N.E.
Calgary, Alberta
T2E 6L5
Phone: (403) 276-9481

* Indicates Sup- pression Only † Weeds controlled or suppressed by herbicide reg- istered for use on the crop, based upon preliminary research data.	HERBICIDE SELECTOR CHART – CEREALS AND OILSEEDS																					
	VOLUNTEER CEREALS	BARNYARD GRASS	BINDWEEDS	BLUEBUR	BUCKWHEAT (tartary)	BUCKWHEAT (wild)	CANADA THISTLE	CLEAVERS	COMMON CHICKWEED	COMMON GROUNDSEL	CORN SPURRY	COW COCKLE	DANDELION	FIELD HORSETAIL	FLIXWEED	GREEN FOXTAIL	HEMP NETTLE	HENBIT	KNAWEL	KOCHIA		
BARLEY		Hoe-Grass Sodium TCA	Banvel* 2,4-D* Embutox E* Kil-Mor* Target* Tropotox Plus	Brominal M Buctril M 2,4-D Etaprop Pardner + MCPA Stampede CM MCPA*	Afolan + MCPA Banvel Blagal Brominal M Buctril M Etaprop Lorox + MCPA Pardner Sencor Stampede Stampede CM Target Torch Tordon 202C	Afolan + MCPA Banvel Blagal Brominal M Buctril M Embutox E Etaprop Kil-Mor*† Lorox + MCPA* MCPA* Mecoturf* Pardner + MCPA* Sencor Mixes Target* Torch + 2,4-D* Torch + MCPA* Tordon 202C* Tropotox Plus	Banvel* Blagal* Brominal M* 2,4-D* Buctril M* Embutox E* Etaprop* Kil-Mor*† Lorox + MCPA* MCPA* Mecoturf* Pardner + MCPA* Sencor Mixes Target* Torch + 2,4-D* Torch + MCPA* Tordon 202C* Tropotox Plus	Banvel* Banvel + Sencor† Lexone + MCPA† Mecoturf† Pardner† Sencor + MCPA† Torch†	Afolan + MCPA Blagal Lexone Lorox + MCPA Mecoturf Sencor + Mixes	Afolan + MCPA Buctril M Lorox + MCPA Pardner Torch	Afolan + MCPA Banvel Blagal Dyvel Kil-Mor Lexone Lorox + MCPA Mecoturf Sencor + Mixes Target	Afolan + MCPA Banvel Brominal M Buctril M Dyvel Kil-Mor Lorox + MCPA Pardner Target Torch Tordon 202C*	2,4-D* Mecoturf Tordon 202C	Afolan + MCPA* Blagal* 2,4-D*	Afolan + MCPA Blagal† Brominal M Buctril M 2,4-D Etaprop Kil-Mor Lorox + MCPA† MCPA Stampede CM Target Torch† Torch + 2,4-D or MCPA	Afolan + MCPA Blagal Buctril M + MCPA Dyvel Lexone Lexone + MCPA Lorox + MCPA MCPA* MCPA - K64 Pardner + MCPA Sencor Target Torch + 2,4-D or MCPA Tropotox Plus	Lexone or Sencor alone or with MCPA† Torch† Pardner†	Lexone or Sencor alone or with MCPA† Torch† Pardner† Buctril M† Brominal M†	Afolan + MCPA Buctril M† 2,4-D Etaprop Lorox + MCPA Stampede CM Torch Torch + 2,4-D or MCPA Torch + Hoe-Grass			
WHEAT		Hoe-Grass	Banvel* 2,4-D* Embutox E* Kil-Mor* Target* Tropotox Plus	Buctril M Brominal M 2,4-D Etaprop MCPA* Pardner + MCPA Stampede CM	Afolan + MCPA Banvel Blagal Brominal M Buctril M Etaprop Lorox + MCPA Pardner Sencor + Mixes Stampede Stampede CM Target Torch Tordon 202C	Afolan + MCPA Banvel Blagal Brominal M Buctril M Dyvel Embutox E Etaprop Kil-Mor Lorox + MCPA Pardner Stampede Stampede CM Target Torch Tordon 202C	Banvel* Blagal* Brominal M* 2,4-D* Buctril M* Embutox E* Etaprop* Kil-Mor*† Lorox + MCPA* MCPA* Mecoturf* Pardner + MCPA* Sencor Mixes Target* Torch + 2,4-D* Torch + MCPA* Tordon 202C* Tropotox Plus	Banvel* Banvel + Sencor† Lexone + MCPA† Mecoturf† Pardner† Sencor + MCPA† Torch†	Afolan + MCPA Blagal Lexone Lorox + MCPA Mecoturf Sencor + Mixes	Afolan + MCPA Buctril M Lorox + MCPA Pardner Torch	Afolan + MCPA Banvel Blagal Dyvel Kil-Mor Lexone Lorox + MCPA Mecoturf Sencor + Mixes Target	Afolan + MCPA Banvel Brominal M Buctril M Dyvel Kil-Mor Lorox + MCPA Pardner Target Torch Tordon 202C*	2,4-D* Mecoturf Tordon 202C	Afolan + MCPA* 2,4-D* Blagal*	Afolan + MCPA Blagal† Brominal M Buctril M 2,4-D Etaprop Kil-Mor Lorox + MCPA† MCPA Stampede CM Target Torch + 2,4-D or MCPA	Afolan + MCPA Blagal Buctril M + MCPA Dyvel Lexone Lexone + MCPA MCPA* MCPA - K64 Pardner + MCPA Sencor Sencor + MCPA Target Torch + 2,4-D or MCPA Tropotox Plus	Lexone or Sencor alone or with MCPA† Torch† Pardner†	Lexone or Sencor alone or with MCPA Torch† Pardner† Buctril M† Brominal M†	Afolan + MCPA 2,4-D Etaprop Lorox + MCPA Stampede CM Torch Torch + 2,4-D or MCPA Torch + Hoe-Grass			
OATS		Sodium TCA	Banvel* Embutox E* Kil-Mor* Target* Tropotox Plus 2,4-D*	Buctril M Brominal M Pardner + MCPA Stampede CM 2,4-D MCPA*	Afolan + MCPA Banvel Blagal Brominal M Buctril M Embutox E† Lorox + MCPA Pardner Stampede Stampede CM Target Torch	Afolan + MCPA Banvel Blagal Brominal M Buctril M Dyvel Embutox E Kil-Mor Lorox + MCPA Pardner Stampede Stampede CM Target Torch	Banvel* Blagal* Brominal M* 2,4-D* Buctril M* Embutox E* Kil-Mor*† Lorox + MCPA* MCPA* Mecoturf* Pardner + MCPA* Target* Torch + MCPA* Tropotox Plus	Banvel* Mecoturf† Pardner† Torch†	Afolan + MCPA Blagal Lorox + MCPA Mecoturf	Afolan + MCPA Buctril M Lorox + MCPA Pardner Torch	Afolan + MCPA Banvel Blagal Dyvel Kil-Mor Lorox + MCPA Mecoturf Target	Afolan + MCPA Banvel Brominal M Buctril M Dyvel Kil-Mor Lorox + MCPA Pardner Target Torch	Mecoturf 2,4-D*	Afolan + MCPA* 2,4-D* Blagal*	Afolan + MCPA Blagal† Brominal M Buctril M Kil-Mor Lorox + MCPA† Stampede CM Target Torch + MCPA 2,4-D MCPA	Afolan + MCPA Blagal Buctril M + MCPA Dyvel Lorox + MCPA MCPA* MCPA - K64 Pardner + MCPA Target Torch + MCPA Tropotox Plus	Torch† Pardner†	Torch† Pardner† Buctril M† Brominal M†	Afolan + MCPA 2,4-D Lorox + MCPA Stampede CM Torch Torch + MCPA			

OATS		Sodium TCA	Banvel* Embutox E* Kil-Mor* Target* Tropotox Plus 2,4-D*	Buctril M Brominal M Pardner + MCPA Stampede CM 2,4-D MCPA*	Afolan + MCPA Banvel Blagal Brominal M Buctril M Embutox E† Lorox + MCPA Pardner Stampede Stampede CM Target Torch	Afolan + MCPA Banvel Blagal Brominal M Buctril M Dyvel Embutox E Kil-Mor Lorox + MCPA Pardner Stampede Stampede CM Target Torch	Banvel* Blagal* Brominal M* Buctril M* Embutox E* Kil-Mor*† 2,4-D* Lorox + MCPA* MCPA* Mecoturf* Pardner + MCPA* Target* Torch + MCPA* Tropotox Plus	Banvel* Mecoturf† Pardner† Torch†	Afolan + MCPA Blagal Lorox + MCPA Mecoturf	Afolan + MCPA Buctril M Lorox + MCPA Pardner Torch	Afolan + MCPA Banvel Blagal Dyvel Kil-Mor Lorox + MCPA Mecoturf Target	Afolan + MCPA Banvel Brominal M Buctril M Dyvel Kil-Mor Lorox + MCPA Pardner Target Torch	Mecoturf 2,4-D*	Afolan + MCPA* 2,4-D* Blagal*	Afolan + MCPA Blagal† Brominal M Buctril M Kil-Mor Lorox + MCPA† Stampede CM Target Torch + MCPA 2,4-D MCPA	Afolan + MCPA* Lorox + MCPA* Sodium TCA Stampede Stampede CM	Afolan + MCPA Blagal Buctril M + MCPA Dyvel Lorox + MCPA MCPA* MCPA - K64 Pardner + MCPA Target Torch + MCPA Tropotox Plus	Torch† Pardner†	Torch† Pardner† Buctril M† Brominal M†	Afolan + MCPA 2,4-D Lorox + MCPA Stampede CM Torch Torch + MCPA		
RYE (SPRING APPLICATION)		Hoe-Grass	Tropotox Plus 2,4-D* MCPA*	2,4-D MCPA*	MCPA* Tropotox Plus†	MCPA* Tropotox Plus†	2,4-D* MCPA* Tropotox Plus							2,4-D*	2,4-D*	2,4-D	Hoe-Grass	Tropotox Plus MCPA*			2,4-D	2,4-D MCPA*
RAPESEED		Basfapon Dowpon M Hoe-Grass Sodium TCA Treflan			Treflan†	Treflan	Benazolin*	Benazolin†	Treflan			Treflan					Basfapon Dowpon M Hoe-Grass Sodium TCA Treflan	Treflan*†				
FLAX	Asulox F* Eptam	Asulox F* Basfapon Dowpon M Eptam Hoe-Grass Sodium TCA Treflan	Basagran 2,4-D*	Asulox F* Brominal M Buctril M Pardner + MCPA Stampede CM 2,4-D MCPA	Asulox F* Blagal Brominal M Buctril M Lorox + MCPA MCPA* Pardner* Stampede Stampede CM Torch Treflan†	Asulox F* Blagal Brominal M Buctril M Lorox + MCPA MCPA* Pardner Stampede Stampede CM Torch Treflan	Basagran Blagal* Brominal M* Buctril M* Lorox + MCPA* MCPA* Pardner + MCPA* Torch + 2,4-D* Torch + MCPA*		Basagran Blagal Eptam Lorox + MCPA Treflan	Basagran Buctril M Pardner Torch Lorox + MCPA	Blagal Eptam Lorox + MCPA Basagran	Brominal M Buctril M Lorox + MCPA Pardner Torch Treflan	Asulox F*† 2,4-D*	2,4-D* Blagal*	Blagal† Brominal M Buctril M 2,4-D Stampede CM	Basfapon Asulox F* Dowpon M Eptam Lorox + MCPA* Hoe-Grass Sodium TCA Stampede Stampede CM Treflan	Blagal Buctril M + MCPA Lorox + MCPA MCPA - K64 MCPA* Pardner + MCPA Torch + MCPA	Eptam†		2,4-D Buctril M Lorox + MCPA Stampede CM Torch Torch + Hoe-Grass Torch + MCPA		
MUSTARD		Hoe-Grass Treflan			Treflan†	Treflan			Treflan			Treflan					Hoe-Grass Treflan	Treflan*†				

KOCHIA	LAMB'S- QUARTERS	LEAFY SPURGE	MUSTARDS, VOLUNTEER RAPESEED	NARROW- LEAVED HAWKS- BEARD	PERSIAN DARNEL	PROSTRATE PIGWEEED	RAGWEED	REDROOT PIGWEEED	RUSSIAN THISTLE	SCENTLESS CHAMOMILE	SHEPHERD'S PURSE	SMART WEED (Lady's Thumb)	SOW THISTLES (annual and perennial)	STINKWEED	STORK'S BILL	TOADFLAX	WILD OATS, VOLUNTEER OATS	WILD RADISH
Afolan + MCPA Buctril M† 2,4-D Etaprop Lorox + MCPA Stampede CM Torch Torch + 2,4-D or MCPA Torch + Hoe-Grass	Afolan + MCPA Blagal Brominal M Buctril M 2,4-D Dyvel Embutox E Etaprop Kil-Mor Lexone Lexone + MCPA Lorox + MCPA MCPA Pardner Sencor Sencor + MCPA Stampede Stampede CM Target Torch Tordon 202C Tropotox Plus	Banvel*† 2,4-D* MCPA*	Afolan + MCPA Blagal Brominal M Buctril M 2,4-D Dyvel Embutox E Etaprop Kil-Mor Lexone Lorox + MCPA MCPA Pardner Pardner + MCPA Sencor Sencor + MCPA Stampede CM Target Torch Torch + 2,4-D or MCPA Torch + Hoe-Grass Tordon 202C Tropotox Plus	Embutox E	Hoe-Grass Torch + Hoe-Grass	Afolan + MCPA 2,4-D Kil-Mor Lorox + MCPA Target	Afolan + MCPA Blagal† Buctril M 2,4-D Dyvel Embutox E Etaprop Kil-Mor† Lorox + MCPA Pardner + MCPA Target Tropotox Plus MCPA	Afolan + MCPA Blagal Brominal M Buctril M 2,4-D* Dyvel Embutox E Etaprop Kil-Mor Lorox + MCPA MCPA* Pardner† Stampede Stampede CM Target Torch Torch + 2,4-D or MCPA Tordon 202C Tropotox Plus Sencor	Brominal M Buctril M Etaprop 2,4-D* Kil-Mor Pardner Target† Torch Torch + 2,4-D or MCPA Tordon 202C Dyvel Pardner + MCPA	Banvel*† Brominal M Buctril M Pardner + MCPA† Torch + MCPA† Tordon 202C*	Afolan + MCPA Blagal† Brominal M Buctril M 2,4-D Embutox E Etaprop Kil-Mor Lorox + MCPA MCPA* Stampede Stampede CM Target Tordon 202C† Tropotox Plus	Afolan + MCPA Banvel Blagal Brominal M Buctril M Dyvel Embutox E Etaprop Kil-Mor Lorox + MCPA Lexone MCPA* Pardner Sencor Sencor + MCPA Stampede Stampede CM Target Torch Torch + 2,4-D MCPA Tordon 202C Tropotox Plus	Afolan + MCPA Blagal Brominal M Buctril M 2,4-D Embutox E Etaprop Kil-Mor Lorox + MCPA MCPA Pardner + MCPA Sencor Sencor + MCPA Stampede Stampede CM Target Torch Torch + 2,4-D or MCPA Tordon 202C Tropotox Plus Dyvel	Afolan + MCPA Etaprop Lorox + MCPA Lexone or Sencor + MCPA†	2,4-D†	Avadex Avenge Carbyne Hoe-Grass Neobyne Wypout	Afolan + MCPA 2,4-D Embutox Et Lorox + MCPA MCPA* Tropotox Plus†	
Afolan + MCPA 2,4-D Etaprop Lorox + MCPA Stampede CM Torch Torch + 2,4-D or MCPA Torch + Hoe-Grass	Afolan + MCPA Blagal Brominal M Buctril M 2,4-D Dyvel Embutox E Etaprop Kil-Mor Lexone Lorox + MCPA MCPA Pardner Sencor Sencor + MCPA Stampede Stampede CM Target Torch Torch + 2,4-D or MCPA Torch + Hoe-Grass Tordon 202C Tropotox Plus	Banvel*† 2,4-D* MCPA*	Afolan + MCPA Blagal Brominal M Buctril M 2,4-D Dyvel Embutox E Etaprop Kil-Mor Lexone Lorox + MCPA MCPA Pardner Pardner + MCPA Sencor Sencor + MCPA Stampede CM Target Torch Torch + Hoe-Grass Torch + 2,4-D or MCPA Tordon 202C Tropotox Plus	Embutox E	Hoe-Grass Torch + Hoe-Grass	Afolan + MCPA 2,4-D Kil-Mor Lorox + MCPA Target	Afolan + MCPA Blagal† Buctril M 2,4-D Dyvel Embutox E Etaprop Kil-Mor† Lorox + MCPA Pardner + MCPA Target Tropotox Plus MCPA	Afolan + MCPA Blagal Brominal M Buctril M 2,4-D* Dyvel Embutox E Etaprop Kil-Mor Lorox + MCPA MCPA* Pardner† Stampede Stampede CM Target Torch Torch + 2,4-D or MCPA Tordon 202C Tropotox Plus	Brominal M Buctril M Etaprop 2,4-D* Dyvel Kil-Mor Pardner Target† Torch Torch + 2,4-D or MCPA Tordon 202C	Banvel* Brominal M Buctril M Pardner + MCPA† Torch + MCPA† Tordon 202C*	Afolan + MCPA Blagal† Brominal M Buctril M 2,4-D Embutox E Etaprop Kil-Mor Lorox + MCPA MCPA* Stampede Stampede CM Target Tordon 202C† Tropotox Plus	Afolan + MCPA Banvel Blagal Brominal M Buctril M Dyvel Embutox E Etaprop Kil-Mor Lexone Lexone + MCPA Lorox + MCPA MCPA* Pardner Sencor + Mixes Stampede Stampede CM Target Torch Torch + 2,4-D or MCPA Tordon 202C Tropotox Plus	Afolan + MCPA Banvel* Blagal*† Brominal M* Buctril M* 2,4-D* Embutox E Etaprop* Kil-Mor MCPA* Pardner + MCPA Target Torch + MCPA or 2,4-D Tordon 202C* Tropotox Plus Lorox + MCPA Sencor + Mixes	Afolan + MCPA Blagal Brominal M Buctril M 2,4-D Dyvel Embutox E Etaprop Kil-Mor Lorox + MCPA MCPA Pardner + MCPA Sencor Sencor + MCPA Stampede Stampede CM Target Torch Torch + 2,4-D or MCPA Tordon 202C Tropotox Plus	Afolan + MCPA Etaprop Lorox + MCPA Lexone or Sencor + MCPA†	2,4-D†	Avadex Avenge Carbyne Hoe-Grass Mataven Neobyne Wypout 120	Afolan + MCPA 2,4-D Lorox + MCPA MCPA* Embutox Et Tropotox Plus†
Afolan + MCPA 2,4-D Lorox + MCPA Stampede CM Torch Torch + MCPA	Afolan + MCPA Blagal Brominal M Buctril M 2,4-D Dyvel Embutox E Kil-Mor Lorox + MCPA MCPA Pardner Stampede Stampede CM Target Torch Tropotox Plus	Banvel*† 2,4-D* MCPA*	Afolan + MCPA Blagal Brominal M Buctril M 2,4-D Dyvel Embutox E Kil-Mor Lorox + MCPA MCPA Pardner Stampede CM Target Torch Tropotox Plus	Embutox E		Afolan + MCPA 2,4-D Kil-Mor Lorox + MCPA Target	Afolan + MCPA Blagal† Buctril M 2,4-D Embutox E Kil-Mor Lorox + MCPA MCPA Pardner + MCPA Target Tropotox Plus Dyvel	Afolan + MCPA Blagal Brominal M Buctril M 2,4-D* Dyvel Embutox E Kil-Mor Lorox + MCPA MCPA* Pardner† Stampede Stampede CM Target Torch Torch + MCPA Tropotox Plus	Brominal M Buctril M 2,4-D* Dyvel Kil-Mor Pardner Target† Torch Torch + MCPA	Banvel*† Brominal M Buctril M Pardner + MCPA† Torch + MCPA†	Afolan + MCPA Blagal† Brominal M Buctril M 2,4-D Embutox E Kil-Mor Lorox + MCPA MCPA* Stampede Stampede CM Target Tropotox Plus	Afolan + MCPA Banvel Blagal Brominal M Buctril M Dyvel Embutox E Kil-Mor Lorox + MCPA MCPA* Pardner Stampede Stampede CM Target Torch Torch + MCPA Tropotox Plus	Afolan + MCPA Banvel* Blagal*† Brominal M* Buctril M* 2,4-D* Embutox E Kil-Mor Lorox + MCPA MCPA* Pardner + MCPA Target Torch + MCPA Tropotox Plus	Afolan + MCPA Blagal Brominal M Buctril M 2,4-D Dyvel Embutox E Kil-Mor Lorox + MCPA MCPA Pardner Stampede Stampede CM Target Torch Torch + MCPA Tropotox Plus	Afolan + MCPA Lorox + MCPA	MCPA†		Afolan + MCPA 2,4-D Lorox + MCPA MCPA* Embutox Et

		Stampede Stampede CM Torch Torch + 2,4-D or MCPA Torch + Hoe-Grass Tordon 202C Tropotox Plus		Sencor + MCPA Stampede CM Torch Torch + Hoe-Grass Torch + 2,4-D or MCPA Tordon 202C Tropotox Plus					Torch + 2,4-D or MCPA Tordon 202C Tropotox Plus				Mixes Stampede Stampede CM Torch Torch + 2,4-D or MCPA Tordon 202C Tropotox Plus	Tropotox Plus Lorox + MCPA Sencor + Mixes	MCPA Stampede Stampede Torch Torch + or MCPA Tordon 202C Tropotox
† al M†	Afolan + MCPA 2,4-D Lorox + MCPA Stampede CM Torch Torch + MCPA	Afolan + MCPA Blagal Brominal M Buctril M 2,4-D Dyvel Embutox E Kil-Mor Lorox + MCPA MCPA Pardner Stampede Stampede CM Target Torch Tropotox Plus	Banvel*† MCPA* 2,4-D*	Afolan + MCPA Blagal Brominal M Buctril M Dyvel 2,4-D Embutox E Kil-Mor Lorox + MCPA MCPA Pardner Stampede Stampede CM Target Torch Torch + MCPA Tropotox Plus	Embutox E		Afolan + MCPA 2,4-D Kil-Mor Lorox + MCPA Target	Afolan + MCPA Blagal† Buctril M 2,4-D Embutox E Kil-Mor Lorox + MCPA Pardner + MCPA Target Tropotox Plus Dyvel	Afolan + MCPA Blagal Brominal M Buctril M 2,4-D* Dyvel Embutox E Kil-Mor Lorox + MCPA Stampede MCPA* Pardner† Pardner + MCPA Stampede Stampede CM Target Torch Torch + MCPA Tropotox Plus	Brominal M Buctril M 2,4-D* Dyvel Kil-Mor Pardner Target† Torch Torch + MCPA	Banvel*† Brominal M Buctril M Pardner + MCPA† Torch + MCPA†	Afolan + MCPA Blagal† Brominal M Buctril M 2,4-D Embutox E Kil-Mor Lorox + MCPA MCPA* Stampede Stampede CM Target Tropotox Plus	Afolan + MCPA Banvel Blagal Brominal M Buctril M 2,4-D Embutox E Kil-Mor Lorox + MCPA MCPA* Pardner Stampede Stampede CM Target Torch Torch + MCPA Tropotox Plus	Afolan + MCPA Banvel* Blagal*† Brominal M* Buctril M* 2,4-D* Embutox E Kil-Mor Lorox + MCPA MCPA* Pardner + MCPA Target Torch + MCPA Tropotox Plus	Afolan + MCPA Blagal Brominal M Buctril M 2,4-D Dyvel Embutox Kil-Mor Lorox + MCPA MCPA Pardner Stampede Stampede Target Torch Torch + MCPA Tropotox
	2,4-D	2,4-D MCPA Tropotox Plus	2,4-D* MCPA*	2,4-D MCPA Tropotox Plus		Hoe-Grass	2,4-D	2,4-D MCPA Tropotox Plus	2,4-D* MCPA* Tropotox Plus	2,4-D*		2,4-D MCPA* Tropotox Plus	MCPA* Tropotox Plas	2,4-D* MCPA* Tropotox Plus	2,4-D MCPA Tropotox
		Treflan		Benazolin (wild mustard)		Hoe-Grass Treflan	Treflan		Treflan	Treflan			Treflan*†		
	2,4-D Buctril M Lorox + MCPA	Basagran Blagal Brominal M Buctril M	2,4-D* MCPA*	Asulox F* Basagran Blagal Brominal M		Hoe-Grass Torch + Hoe-Grass Treflan	2,4-D Eptam Lorox + MCPA	Basagran Blagal† Buctril M 2,4-D	Basagran Blagal Brominal M Buctril M	Basagran Brominal M Buctril M 2,4-D*	Brominal M Buctril M Pardner + MCPA†	Blagal† Brominal M Buctril M 2,4-D	Asulox F* Basagran Blagal Brominal M	Blagal*† Brominal M* Buctril M* 2,4-D*	Asulox F Blagal Brominal Buctril M

* Indicates Suppression Only • Do Not Graze † Weeds controlled or suppressed by herbicide, registered for use on the crop, based upon preliminary research data.		HERBICIDE SELECTOR CHART — FORAGE CROPS														
								Brush Silverberry, Aspen, Western Snowberry, Choke Cherry, Willow, Alder, Prairie Sage, Pasture Sage, Wild Rose								
CROP	CROP STAGE	Absinth	Foxtail Barley	Field Bindweed	Barnyard Grass	Bluebur	Blue Lettuce	Wild Buckwheat	Canada Thistle	Night Flowering Catchfly	Chickweed	Common Groundsel	Dandelion	Green Foxtail		
Alfalfa	Seedling		Eptam Kerb	Emtutox E	Asulox F • Hoe-Grass Dowpon M Kerb Eptam	Asulox F•	Embutox Et†	Mow	Embutox E, Asulox F•	Embutox E		Kerb, Eptam (ppi)	Embutox Et†	Embutox Et†	Kerb, Eptam (ppi), Asulox F•, Hoegrass, Dowpon M•	
	Established		Princep Kerb, Sinbar†		Asulox F • Dowpon M Kerb Princep	Sinbar Asulox F• Princep	Sinbar Princep	Mow	Princep, Asulox F• Sinbar		Princep	Kerb, Sinbar, Princep	Princep	Sinbar*	Kerb, Asulox F•, Dowpon M•, Princep, Sinbar	
Alsike Clover	Seedling			Embutox E, Tropotox Plus			Embutox Et† Tropotox Plus†	Mow	Embutox E Tropotox Plus†	Embutox E, Tropotox Plus			Tropotox Plus† Embutox Et†	Embutox Et†, Tropotox Plus†		
	Established							Mow								
Red Clover	Seedling			Tropotox Plus	Hoe-Grass		Tropotox Plus†	Mow	Tropotox Plus†	Tropotox Plus			Tropotox Plus†	Tropotox Plus†	Hoegrass	
	Established							Mow								
White Dutch Clover	Seedling			Embutox E, Tropotox Plus			Embutox Et†	Mow	Embutox E	Tropotox Plus Embutox E			Tropotox Plus†, Embutox Et†	Embutox Et†,		
	Established							Mow								
Sweet Clover	Seedling				Hoe-Grass			Mow							Hoegrass,	
	Established							Mow								
Birdsfoot Trefoil	Seedling		Eptam Kerb	Embutox E	Dowpon M Kerb		Embutox Et†	Mow	Embutox E	Embutox E		Kerb, Eptam (ppi)	Embutox Et†	Embutox Et†	Kerb, Eptam (ppi), Dowpon M•	
	Established		Princep Kerb		Dowpon M Princep Kerb	Princep	Princep	Mow	Princep		Princep	Kerb, Princep	Princep		Kerb, Dowpon M•, Princep	
Sainfoin	Seedling							Mow								
	Established							Mow								
Brome grass	Seedling							Mow								
	Established	2,4-D* Mow + 2,4-D		2,4-D*		2,4-D	2,4-D*	Mow, 2,4-D*	2,4-D*	2,4-D				2,4-D		2
Crested Wheatgrass	Seedling				Hoe-Grass			Mow							Hoegrass	
	Established	2,4-D* Mow + 2,4-D		2,4-D*		2,4-D	2,4-D*	Mow, 2,4-D*	2,4-D*†	2,4-D				2,4-D		2
Intermediate Wheatgrass	Seedling				Hoe-Grass			Mow							Hoegrass	
	Established	2,4-D* Mow + 2,4-D		2,4-D*		2,4-D	2,4-D*	Mow, 2,4-D*	2,4-D*†	2,4-D				2,4-D		2
Seed Only																
Creeping Red Fescue	Seedling			Banvel*	Hoe-Grass			Banvel* Mow	Banvel	Banvel	Banvel†				Hoegrass	
								Banvel								

Intermediate Wheatgrass	Seedling				Hoe-Grass			Mow							Hoegrass	
	Established	2,4-D* Mow + 2,4-D		2,4-D*		2,4-D	2,4-D*	Mow, 2,4-D*	2,4-D*†	2,4-D				2,4-D		2,4-D
Seed Only																
Creeping Red Fescue	Seedling			Banvel*	Hoe-Grass			Banvel* Mow	Banvel	Banvel	Banvel†				Hoegrass	
	Established	Mow + 2,4-D		Banvel* Banvel + 2,4-D		2,4-D	2,4-D	Banvel Banvel + 2,4-D Mow	Banvel 2,4-D*	Banvel 2,4-D*	Banvel†			2,4-D*		2,4-D
Russian Wild Rye	Seedling				Hoe-Grass			Mow							Hoegrass	
	Established	Mow + 2,4-D		2,4-D*		2,4-D	2,4-D	Mow	2,4-D†	2,4-D*				2,4-D*		2,4-D
Timothy	Seedling							Mow								
	Established							Mow		2,4-D*						
Hay and Grazing	With Legumes			Embutox E Tropotox Plus			Embutox E† Tropotox Plus†	2,4-D Ester - Dormant Season	Embutox E, Tropotox Plus†	Embutox E, Tropotox Plus				Embutox E†, Tropotox Plus†		
	No Legumes	Banvel,* Mow + 2,4-D MCPA		Embutox E, Banvel,* Tropotox Plus		2,4-D, MCPA, Banvel†	2,4-D, MCPA†	Banvel, 2,4-D	Banvel 2,4-D†, MCPA* Embutox E	2,4-D*, MCPA*, Banvel, Embutox E Tropotox Plus	Banvel†			2,4-D, MCPA† Embutox E†, Banvel + 2,4-D, Tropotox Plus†		2,4-D

[illegible]

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HERBICIDE SELECTOR CHART – OTHER CROPS

* Indicates Suppression Only
† Weeds controlled or suppressed by herbicide, registered for use on the crop, based upon preliminary research data.

	Barnyard Grass	Buckwheat (Tartary)	Buckwheat (Wild)	Canada Thistle	Chickweed	Cocklebur	Corn Spurry	Cow Cockle	Foxtail (Green)	Goosefoot	Groundsel (Common)	Hemp-nettle	Knotweed	Kochia	Lambs' Quarters	Mustards
Beans (Snap and Dry) * Check label to ensure chosen chemical or mix is registered for use on the crop.	Dual Eptam Treflan		Treflan	Basagran	Basagran Eptam Treflan	Basagran	Basagran Eptam	Treflan	Dual Eptam Treflan		Basagran		Treflan		Basagran Eptam Treflan	Basagran
Canary Seed		Brominal M Buctril M Pardner Torch	Brominal M Buctril M Pardner Torch	Brominal M* Buctril M*				Brominal M Buctril M Pardner Torch			Buctril M Pardner Torch	Buctril M + MCPA		Torch	Brominal M Buctril M Pardner Torch	Brominal M Buctril M Pardner Torch
Carrots and Parsnips (c-carrots)	Treflan (c) Maloran (c)	Afolan F Lorox (c)	Afolan F Maloran (c) Lorox (c) Treflan (c)	Lorox * (c)	Afolan F Maloran (c) Lorox (c) Treflan (c)		Afolan F Lorox(c) Treflan (c)	Afolan F Lorox (c)	Afolan F* Lorox* Maloran (c) Treflan (c)	Afolan F Lorox (c)	Afolan F Maloran (c) Lorox (c)	Afolan F Lorox (c)	Afolan F Lorox (c) Treflan (c)	Afolan F Lorox (c)	Afolan F Lorox (c) Treflan (c)	Afolan F Lorox (c) Maloran (c)
Corn * Check label to ensure chosen chemical or mix is registered for use on the crop.	Aatrex + Mixes Dual + Mixes Eradicane Princep	Banvel Kil-Mor Pardner Torch	Aatrex + Mixes Banvel Embutox E Kil-Mor Pardner Princep Torch	Banvel* Basagran 2,4-D* Embutox E* Kil-Mor Tropotox Plus	Basagran Eradicane Princep	Basagran 2,4-D amine Kil-Mor Embutox E MCPA amine	Banvel Basagran Eradicane Kil-Mor	Banvel Pardner Torch Kil-Mor	Aatrex + Mixes Dual + Mixes Eradicane Lasso	Embutox E 2,4-D amine	Pardner Torch Basagran	MCPA amine Tropotox Plus	Kil-Mor Tropotox-Plus	2,4-D amine Torch	Aatrex + Mixes Basagran 2,4-D amine Eradicane Embutox E Kil-Mor Lasso MCPA amine Pardner Princep Torch Tropotox Plus†	Aatrex + Mixes Basagran 2,4-D amine Embutox E Kil-Mor MCPA amine & salts Pardner Torch Tropotox Plus
Fababeans	Treflan	Sencor	Treflan	Basagran	Basagran Sencor Treflan	Basagran	Basagran Sencor	Treflan	Treflan		Basagran	Sencor Sencor + Treflan	Treflan		Basagran Sencor Treflan	Basagran Sencor Sencor + Treflan
Lentils	Hoegrass	Sencor			Sencor		Sencor		Hoegrass			Sencor			Sencor	Sencor
Peas (Field and Processing) * Check label to ensure chosen chemical or mix is registered for use on the crop.	Basfapon Dowpon M Hoegrass Sodium TCA Treflan	MCPA*	MCPA* Treflan	Basagran MCPA* Tropotox Tropotox Plus	Basagran Treflan	Basagran MCPA Tropotox†	Basagran	Treflan	Basfapon Dowpon M Hoegrass Sodium TCA Treflan	MCPA	Basagran	MCPA* Tropotox Tropotox Plus	Treflan Tropotox Plus		Basagran MCPA Treflan Tropotox Tropotox Plus	Basagran MCPA Tropotox Tropotox Plus
Potatoes	Basfapon Dual Eptam Maloran Patoran Sencor	Lorox	Lorox Gramoxone Maloran Sencor†	Lorox*	Eptam Lexone Lorox Maloran Patoran Sencor		Eptam Lexone Lorox Patoran Sencor	Lorox	Basfapon Dual Eptam Lexonet Lorox * Maloran Patoran Sencor†		Lexonet Lorox Maloran Patoran Sencor†	Lexone Lorox Sencor	Lorox	Lexonet Lorox Gramoxone Maloran† Patoran† Sencor†	Eptam Lexone Lorox Maloran Patoran Sencor	Lexonet Lorox Gramoxone Maloran Patoran Sencor

Peas (Field and Processing) <small>* Check label to ensure chosen chemical or mix is registered for use on the crop.</small>	Basfapon Dowpon M Hoegrass Sodium TCA Treflan	MCPA*	MCPA* Treflan	Basagran MCPA* Tropotox Tropotox Plus	Basagran Treflan	Basagran MCPA Tropotox†	Basagran	Treflan	Basfapon Dowpon M Hoegrass Sodium TCA Treflan	MCPA	Basagran	MCPA* Tropotox Tropotox Plus	Treflan Tropotox Plus	-	Basagran MCPA Treflan Tropotox Tropotox Plus	Basagran MCPA Tropotox Tropotox Plus
Potatoes	Basfapon Dual Eptam Maloran Patoran Sencor	Lorox	Lorox Gramoxone Maloran Sencort	Lorox*	Eptam Lexone Lorox Maloran Patoran Sencor		Eptam Lexone Lorox Patoran Sencor	Lorox	Basfapon Dual Eptam Lexone† Lorox * Maloran Patoran Sencort		Lexonet Lorox Maloran Patoran Sencort	Lexone Lorox Sencor	Lorox	Lexonet Lorox Gramoxone Maloran† Patoran† Sencort	Eptam Lexone Lorox Maloran Patoran Sencor	Lexonet Lorox Gramoxone Maloran Patoran Sencor
Rutabagas	Eptam Treflan		Treflan		Eptam Treflan		Eptam	Treflan	Eptam Treflan				Treflan		Eptam Treflan	
Soybeans	Treflan		Treflan	Basagran	Treflan	Basagran	Basagran	Treflan	Treflan		Basagran		Treflan		Basagran Treflan	Basagran
Sunflowers	Amibent + Treflant Eptam Treflan		Treflan		Amiben + Treflan Eptam Treflan		Eptam	Treflan	Amiben + Treflan Eptam Treflan			Amibent + Treflant	Treflan		Amiben + Treflan Eptam Treflan	Amiben - Treflan
Tame Buckwheat	Basfapon Hoegrass								Basfapon Hoegrass							
Triticale	Hoegrass								Hoegrass							

[illegible]

us	Basagran MCPA Tropotox Tropotox Plus	Basagran	Hoegrass Treflan	Treflan MCPA*†	Basagran MCPA* Treflan Tropotox Tropotox Plus	Basagran MCPA Treflan Tropotox Tropotox Plus	Basagran Treflan	Basagran Tropotox Tropotox Plus MCPA*	MCPA* Tropotox Tropotox Plus	MCPA Tropotox Tropotox Plus	Treflant†	MCPA Basagran
	Lexonet† Lorox Gramoxone Maloran Patoran Sencor	Eptam		Eptam Lexonet† Lorox Maloran Patoran Sencort	Eptam Lexonet† Lorox Maloran Patoran Sencort	Eptam Lorox Malorant† Patoran	Lexonet† Malorant† Patoran Sencort	Gramoxone Lexone Lorox Maloran Patoran Sencor	Lorox	Lorox Patoran	Eptam Lexonet† Sencort	Gramoxo Lexone Sencor
		Eptam	Treflan	Eptam Treflan	Eptam Treflan	Eptam Treflan	Treflan				Eptam	
	Basagran	Basagran	Treflan	Treflan	Basagran Treflan	Basagran Treflan	Basagran Treflan	Basagran		Basagran†	Treflant†	Basagran



N.L.C. - B.N.C.



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